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THE KANSAS SILENT READING TESTS

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In devising tests to be used in measuring any sort of educational product in the public schools, four criteria must always be kept in mind; first, the test should be designed to measure some product of the public schools really worth measuring; second, it should be so simple in its arrangement and in the plan for giving it and scoring the results derived from it that a teacher unskilled in the use of standard tests can understand without difficulty what is expected of her in giving and scoring the test; third, it should be devised to measure progress in the acquisition of a certain ability as well as present standing of the pupils in that ability; fourth, the time consumed in giving the test and in doing the necessary work for scoring should not be so great as to make teachers who do the work feel that it is a task out of proportion to the good derived from doing it. In devising the *Kansas Silent Reading Test* these four criteria were observed throughout.

There has always been a demand on the part of teachers to know how effectively they are developing in their children the ability to get meaning from the printed page. Nothing is more fundamentally important in our school work than the development of this ability. It has been suspected too, that not only do children in the same school room differ very widely with respect to this ability but also that children in one school differ very widely as a group from children of the same grade in another

school, in this ability. This latter situation has been thought to be due in part, at least, to the differences in the conception of reading held by various school superintendents and teachers. One city emphasizes oral reading with stress upon pronunciation and enunciation, while another school emphasizes silent reading, the test being the amount of meaning which children are able to get from the printed page. Since we believe that the more important of these two phases is the one in which stress is placed upon the ability to get meaning from the printed page, we set out to derive tests to measure that ability.

The ability to get meaning from the printed page is a complex thing dependent upon many different factors. However, the two main factors, each one dependent upon a variety of causes, are the speed with which the reader can get over the lines and the accuracy with which he can comprehend the meaning of the lines. It has been customary in previous reading tests, such as Starch's,[1] to measure speed and comprehension separately. In the interest of simplicity we wished to combine in a single mark these two factors. Consequently the plan was to measure the child's ability to read by the number of the reading exercises which he could comprehend accurately within a given time. A child's low mark secured in such a test might be due to his slow rate of reading or to his poor comprehension but in either case the teacher could determine by examining the child's paper which factor was responsible for his mark.

The further difficulty arises of measuring comprehension without measuring it in terms of the ability to reproduce meaning in a written composition. It is generally agreed, I think, that the ability to reproduce is quite a separate ability from the ability to get meaning and, therefore, it seems advisable to have a test of the ability to get meaning which involves a minimum of reproduction.

Having decided this much of the plan, we secured the co-operation of a large number of superintendents in city schools in Kansas in working out the tests to fulfill these requirements. Exercises which should meet the following qualifications were called for:

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[1] DANIEL STARCH. *The Measurement of Efficiency in Reading, Writing, Spelling and English.* Published by The College Book Store, Madison, Wisconsin.

First, the exercises must be subject to but one interpretation.

Second, they must call for but one thing so that the answer given to them would be wholly right or wholly wrong, and not partly right and partly wrong.

Third, they must test the ability to get meaning from the printed page and must not depend for their difficulty upon obscure words nor upon any particular fund of information.

Several hundreds of such exercises were submitted and out of them approximately two hundred seemed to meet fairly well the requirements set forth above and they were evaluated statistically. From these two hundred, the forty-eight which comprise the three tests reproduced below were selected.

Test I, for Grades 3, 4 and 5

Directions for Giving the Tests

After telling the children not to open the papers, ask the children on the front seats to distribute the papers, placing one upon the desk of each pupil in the class. Have each child fill in the blank space at the top of this page. Then make clear the following:

Instructions to be Read by Teacher and Pupils Together

This little five-minute game is given to see how quickly and accurately pupils can read silently. To show what sort of game it is, let us read this:

Below are given the names of four animals. Draw a line around the name of each animal that is useful on the farm:

cow tiger rat wolf

This exercise tells us to draw a line around the word, cow. No other answer is right. Even if a line is drawn *under* the word cow, the exercise is wrong, and counts nothing. The game consists of a lot of just such exercises, so it is wise to study each exercise carefully enough to be sure that you know exactly what you are asked to do. The number of exercises which you can finish thus in five minutes will make your score, so do them as fast as you can, being sure to do them right. Stop at once when time is called. Do not open the papers until told, so that all may begin at the same time.

The teacher should then be sure that each pupil has a good pencil or pen. Note the minute and second by the watch, and say, *begin*.

Allow exactly five minutes.

Answer no questions of the pupils which arise from not understanding what to do with any given exercise.

When time is up say *stop* and then collect the papers at once.

No. 1. Value 1.2

I have red, green and yellow papers in my hand. If I place red and green papers on the chair, which color do I still have in my hand?

_____

No. 2. Value 1.2

Think of the thickness of the peelings of apples and oranges. Put a line around the name of the fruit having the thinner peeling.

apples oranges

No. 3. Value 1.4

Three words are given below. One of them has been left out of this sentence: I cannot ——— the girl who has the flag. Draw a line around the word which is needed in the above sentence.

red see come

No. 4. Value 1.4

There are seven boys and twelve girls in a room. If there are more boys than girls, write boys on the line below. If more girls than boys, write girls on the line below.

_____

No. 5. Value 1.6

If you would rather have a dollar than a little stone, do not put a line under dollar, but if you would rather have five dollars than a pencil, put a line under stone.

dollar stone

No. 6. Value 1.7

The first letter in the alphabet is "a." Below are some words containing the letter "a." Draw a line under the one in which the first letter of the alphabet is found the greatest number of times.

hat easy baby age alas manfully

No. 7. Value 1.8

A child wrote these letters on the blackboard, b y a k. He then rubbed out one letter and put c in its place. He then had b y c k on the backboard. What was the letter which he erased?

_____

No. 8. Value 1.9

Count the letters in each of the words written below. You will find that pumpkin has seven letters, and thanks has six letters. One of the words has five letters in it. If you can find the one having five letters, draw a line around it.

breeze thanks yours pumpkin duck

No. 9. Value 2.0

Here are some names of things. Put a line around the name of the one which is most nearly round in every way like a ball.

saucer teacup orange pear arm

No. 10. Value 2.1

A recipe calls for milk, sugar, cornstarch and eggs. I have milk, sugar and eggs. What must I get before I can use the recipe?

_____

No. 11. Value 2.2

We planted three trees in a row. The first one was nine feet tall and the last one was three feet shorter than the first one. The middle one was two feet taller than the last one. How tall was the middle one?

No. 12. Value 2.2

Below are three lines. If the middle is the longest, put a cross after the last line. If the last line is the longest, put a cross after the first line. If the first line is the longest put a circle in front of the middle line.

No. 13. Value 3.1

Three men have to walk to a town ten miles away. Each man carries a load. The first carries 25 pounds, the second 30 pounds, and the third 40 pounds. The heavier the load the slower the man travels. In order that they may arrive in town at the same time, which man must start first?

No. 14. Value 3.5

My house faces the street. If a boy passes my house going to school in the morning, walking toward the rising sun, with my house on his right hand, which direction does my house face?

No. 15. Value 4.8

Fred has eight marbles. Mary said to him: "If you will give me four of your marbles, I will have three times as many as you will then have." How many marbles do they both have together?

No. 16. Value 8.9

If in the following words e comes right after a more times than e comes just after i, then put a line under each word containing an e and an i, but if e comes just before a more often than right after i, then put a line under each word containing an a and an e.

receive feather teacher believe

TEST II, FOR GRADES 6, 7 AND 8

No. 1. Value 1.0

The air near the ceiling of a room is warm, while that on the floor is cold. Two boys are in the room, James on the floor and Harry on a box eight feet high. Which boy has the warmer place?

No. 2. Value 1.3

If gray is darker than white and black is darker than gray, what color of those named in this sentence is lighter than gray?

No. 3. Value 1.6

We can see through glass, so we call it transparent. We cannot see through iron, so we call it opaque. Is black ink opaque, or is it transparent?

No. 4. Value 2.0

My shepherd dog can run faster than any of my father's large herd of cattle, but he will not chase a rabbit because he learned long ago that a rabbit can easily outrun him. If my dog is no slower than other shepherd dogs, draw a line under the fastest runner of the three animals named below.

rabbit shepherd dog cow

No. 5. Value 2.2

If you find a word in this sentence which may be used to denote color, draw a line under it, but if you do not find such a word, draw a line under the first word of the sentence.

No. 6. Value 2.3

In going to school, James has to pass John's house, but does not pass Frank's. If Harry goes to school with James, whose house will Harry pass, John's or Frank's?

No. 7. Value 2.4

A boy goes to school in the morning, goes home at noon for lunch, returns to school at 1 o'clock and returns home at 4 o'clock. How many times does he travel between home and school that day?

No. 8. Value 2.6

Here are two squares. Draw a line from the upper left hand corner of the small square to the lower right-hand corner of the large square.

No. 9. Value 3.0

A farmer puts one-half the hay from his field into the first stack, then two-thirds of what is left into a second stack, and the remainder into a third stack. Which stack is the largest?

No. 10. Value 3.9

Below are two squares and a circle. If the circle is the largest of the three, put a cross in it. If one square is smaller than the circle, put a cross in the larger square. If both squares are smaller than the circle, put a cross in the small square.

No. 11. Value 4.0

"The curfew tolls the knell of parting day,
The lowing herds wind slowly o'er the lea,
The ploughman homeward plods his weary way,
And leaves the world to darkness and to me."—(Gray)

Study the above quotation carefully. The author lets us know his feeling about the coming of night. If you think his feeling is one of fear and dread, underscore curfew. If his feeling is one of peace and gladness, underscore ploughman.

No. 12. Value 4.0

Read these carefully:

Bears are larger than bugs.
Houses are larger than bears.
Mountains are larger than houses.
Then bugs are not as large as mountains.

I have tried to make no false statement among these four. If I have succeeded, underline the word success. If I have failed, underline the word failure.

success failure

No. 13. Value 4.3

If a man takes an hour to walk around a square each side of which is a mile in length, how long will it take him to walk eight miles?

_____

No. 14. Value 4.9

A list of words is given below. One of them is needed to complete the thought in the following sentence: The roads became muddy when the snow ————

Do not put the missing word in the blank space left in the sentence, but put a cross below the word in the list which is next above the word needed in the sentence.

water
is
melted
snow

No. 15. Value 5.8

I am writing this paragraph to test your ability to read what I compose. Underscore any word in the paragraph which has the same number of letters as the third word from the beginning of the paragraph but which has none of the same letters.

No. 16. Value 10.2

My mother's birthday and mine are on the same day. We always have a round birthday cake together. We put as many candles in a row around the cake as my mother is years old but not all the candles are white ones. We use as many red ones as I am years old. This year we used ten red ones. We found that between each two red ones we had to place two white ones. How old is mother?

TEST III, FOR GRADES 9, 10, 11 AND 12

No. 1. Value 2.1

Mary is older than Nellie, and Nellie is older than Kate. Which girl is older, Mary or Kate?

No. 2. Value 3.3

My fingers were numb with cold from carrying my skates. My breath looked like steam before my face and froze into a thick frost on my muffler. My mother saw me coming and called, "Clean off your shoes and then come in and get warm." Which do you think I had on my shoes, mud or snow?

No. 3. Value 3.5

I have five plums and Mary has four plums. Jane comes along and we see that she hasn't any. We want to divide with Jane in such a way that we shall all three have the same number. I give Jane two plums. How many must Mary give her?

No. 4. Value 3.7

In the following words, find one letter which is contained in only three of them and then cross out the word which does not contain that letter.

ail thief live anvil

No. 5. Value 3.8

A, B, C, and D on the line below represent four places lying in a straight line. From A to B is 4 miles, from C to D is 7 miles, from A to D is 14 miles. How far is it from B to C?

A———B———C———D

No. 6. Value 4.3

Bone is composed of animal matter and mineral matter. The former gives it toughness and the latter rigidity. Yesterday I placed a bone from a chicken's leg in a bottle of acid, and found this morning that I could wrap the bone around my finger like gristle. Which kind of matter was removed from the bone?

No. 7. Value 4.4

The pitch of a tone depends on the number of vibrations made by the vibrating body in a second of time. The greater the number of vibrations per second, the higher the tone. Two bodies are made to vibrate, the former 256 times a second, and the latter 384 times a second. Which produces the lower tone, the former or the latter?

No. 8. Value 4.8

There are three horizontal lines; the first is three inches in length, the second two inches, the third one inch. We know that if the second and third lines are joined end to end the resulting line will be as long as the first line. Suppose that the first and second lines are joined end to end. How many times as long as the third line will the resulting line be?

No. 9. Value 4.9

It was a quiet, snowy day. The train was late. The ladies' waiting-room was dark, smoky and close, and the dozen women, old and young, who sat waiting impatiently, all looked cross, low spirited or stupid.

In this scene, the women probably kept their wraps on, because they wished to be ready to take the train. Pretty soon the station agent came and put more coal in the stove, which was already red-hot in spots. Do you think this made the women happier?

No. 10. Value 5.6

Below are three lines. If the first line is the shortest, place a dot above it. If the last line is shorter than the first but longer than the middle line, put a cross above the longest. If each of the other lines is longer than the last line, put a cross above the shortest line.

No. 11. Value 6.2

Four hundred fifty years ago the people of Western Europe were getting silks, perfumes, shawls, ivory, spices, and jewels from Southeastern Asia, then called the Indies. But the Turks were conquering the countries across which the goods were carried, and it seemed likely that the trade would be stopped.

In the foregoing paragraph, what was the country called from which the people of Western Europe were getting the goods named in the paragraph?

No. 12. Value 7.0

Mrs. White and I were talking. She said to me, "Nora, I learned the other day that I am five years older than your mother."

To this I answered, "Then, Mrs. White, you are just three times as old as I am."

Nora is twelve years old. How old is her mother?

No. 13. Value 7.9

"Magnanimity in politics is not seldom the truest wisdom; and a great empire and little minds go together." (Burke)

Study Burke's quotation carefully. If he was in favor of territorial expansion as the goal of English politicians he was a standpatter. If he believed in the establishment of justice in human relations even at the sacrifice of territorial expansion, he was a progressive. Which was he, a standpatter or a progressive?

No. 14. Value 8.3

Without making a line on paper at all, follow these instructions in your imagination. From the right hand end of a line AB, draw a line BC at right angles to AB and half as long as AB. From the extremity of BC draw a line CD through the middle of AB, three times as long as BC. Join A and D. Do the lines in the figure enclose any surface or surfaces? If so, how many?

No. 15. Value 8.9

Suppose that I have a dry sponge which weighs a half pound, and a pan of water. The pan and the water weigh three and one-half pounds. I soak the sponge in the pan of water and wring it out into a pint measure until the measure is full. The pint of water weighs a pound. I now put the sponge into the pan of water and weigh the pan and its contents. What will the weight be?

No. 16. Value 52.0

At sea level water boils at 212 degrees above zero on the Fahrenheit thermometer, and at 100 degrees above zero on the Centigrade thermometer. The zero point on the Centigrade thermometer represents the same temperature as 32 degrees on the Fahrenheit thermometer. A change in temperature which would raise the mercury in a Centigrade thermometer 5 degrees would raise the mercury in a Fahrenheit thermometer how many degrees?

It will be noted that a certain value is assigned to each exercise. The rather involved process by which these values were derived is explained in full in a bulletin published by the Bureau of Educational Measurements and Standards of the State Normal School at Emporia, Kansas. Space will not permit of giving a full account of the method here. We must content ourselves by saying here that the value attached to each exercise indicates

the relative length of time required on the average by children of a certain grade to do the exercise correctly. Approximately sixty children did each exercise under uniform conditions and the time required was determined for each group of five children. The children who took a given exercise were from four different cities and from three different grades in each city. Thus a fairly representative group was used with each exercise.

Assuming that these values are accurately determined, it will be seen that the difference in ability represented by securing a score of seven and that of securing a score of eight is equal to the difference in ability required to secure a score of twelve and that required to secure a score of thirteen. Therefore, progress can be measured by the use of the test because an increase in the score by any number of points on the scale represents improvement equal to an increase in the score by the same number of points at any other place along the scale.

The directions for scoring the papers, will be found below:

Directions for Scoring Papers

1. Every answer given is counted either wholly right or wholly wrong.
2. Where the child's answer is incorrect, cross out the value indicated for that exercise in the margin.
3. Add the values of the exercises which are correctly answered. This sum is the child's score.
4. Place the score in the upper right-hand corner of the front page, in the square made for that purpose.
5. As a safeguard against teacher's misreading the exercises, the following answers are given:

Correct Answers to Some of the More Difficult Exercises.

Test for Grades 3, 4, 5:

No. 11. Ans.—8.
No. 14. Ans.—north.
No. 15. Ans.—16.
No. 16. Ans.—line under feather and teacher.

Test for Grades 6, 7, 8:

No. 5. Ans.—line under if.
No. 10. Ans.—cross in the large square.
No. 11. Ans.—line under ploughman.
No. 12. Ans.—line under success.
No. 13. Ans.—2 hours.
No. 15. Ans.—line under compose.
No. 16. Ans.—30 years.

Test for Grades 9, 10, 11, 12:

No. 2. Ans.—snow.
No. 3. Ans.—1.
No. 4. Ans.—line through thief.
No. 5. Ans.—3 miles.
No. 6. Ans.—mineral matter.
No. 7. Ans.—the former.
No. 8. Ans.—5 times.
No. 9. Ans.—no.
No. 10. Ans.—cross above the shortest line.
No. 12. Ans.—31 years.
No. 13. Ans.—a progressive.
No. 14. Ans.—2 surfaces.
No. 15. Ans.—3 pounds.
No. 16. Ans.—9 degrees.

The following median scores were obtained by giving the tests in May, 1915:

Grade,	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Number of children tested,	1207	1473	1535	1264	1338	912	621	487	324	91
Median score,	6.0	9.9	13.7	13.4	16.5	18.8	22.9	25.8	26.0	28.8

Revised standards will be determined from the scores obtained during the year 1915–'16. A copy of these standards will be sent to all who report their scores to the Bureau of Educational Measurements and Standards, Emporia, Kan.

A copy of the bulletin describing the derivation of these tests will be mailed upon request.

With regard to the time involved in giving the test, in scoring the papers, in making the necessary distributions and in finding the median score for the class, naturally some variation among teachers is to be expected, but of those from whom inquiry has been made, it seems the average time required for giving the test is certainly less than fifteen minutes and the time for scoring the papers of a class of thirty-five children, making the distribution called for, and recording the median, ranges from twenty-five minutes in the lower grades to forty minutes in the upper grades. This, we believe, meets the requirements of simplicity and of the amount of time available for the teacher to administer the test.

With reference now to results which have been secured through the giving of the test, I shall not undertake to summarize the returns which are being sent in during this present school year but rather quote the results which were secured by giving the test to 9252 children in nineteen cities in Kansas in May, 1915. The accompanying Tables I, II and III show the distribution by grades of the scores made with each of the three tests. They reveal wide variation in ability in each grade. We have become accustomed to this range of ability in a given class through the use of standard tests in other common branches, but in no other

subject, we think, has variation quite so wide been revealed. For instance, in the third grade while 6.4 per cent. of the children cannot do a single exercise in five minutes, 8.1 per cent. can do exercises the sum of whose values is fifteen or more. That means more than 9 exercises of the test. While the median score is 6 in the third grade, one child in 6 can do twice as many and can secure a score of at least 12.

Another striking fact is apparent from these tables. There are some children in nearly all the grades who cannot do any of the exercises called for in 5 minutes while the median scores increase from grade to grade by approximately 3 points. Certain children are being promoted from grade to grade even though they cannot gain perceptibly in reading ability. Allowing for the few cases where normal intelligence is absent the wide variation among the pupils who are supposed to be able to do the same work in school indicates a serious problem confronting the teacher. Assignments which one-fourth of the children require 50 minutes or more to complete where the principal task is interpreting the printed page, may be done by another fourth of the class in 20 minutes or less in the case of practically all grades of children. Almost as wide variation occurs when the members of a group which is taught by a single teacher are considered instead of a combined grade group from all the schools.

One other fact stands out also in these tables. The reading ability possessed by the median child in any one grade is superior to the ability possessed by at least a third of the children in the class above him and is no better than the reading ability possessed by at least a third in the class below him. The differentiation, therefore, in reading ability from year to year is insignificant in comparison with the wide difference in ability among the children in any given year or grade. The over-lapping of ability from grade to grade can be seen by following across the table from left to right and noting that most of the scores are represented in practically all grades.

From the list of the medians at the bottom of the tables, it will be observed that there is an abrupt break in the scores between fifth and sixth grades and a less abrupt but nevertheless certain break between the eighth and ninth grades. These breaks are due to the fact that one test was given to grades 3, 4 and 5 and another test to grades 6, 7 and 8 and a third test to grades 9,

TABLE I.

Distributions, by grades, of scores, both whole numbers and percents., secured by children in 19 cities using Test I of the Kansas Silent Reading Tests.

Scores Between	Grade III		Grade IV		Grade V	
	No. of Children	Per Cent. of Children	No. of Children	Per Cent. of Children	No. of Children	Per Cent. of Children
0– .9	77	6.4	29	1.9	4	.2
1– 1.9	89	7.4	30	2.0	10	.6
2– 2.9	125	10.4	40	2.7	20	1.3
3– 3.9	81	6.7	33	2.2	17	1.1
4– 4.9	102	8.5	80	5.4	32	2.1
5– 6.9	261	21.7	228	15.5	111	7.2
7– 8.9	158	13.2	213	14.5	165	10.8
9–10.9	94	7.8	194	13.2	163	10.6
11–12.9	64	5.3	172	11.7	172	11.2
13–14.9	61	5.1	170	11.5	204	13.3
15–17.9	46	3.8	128	8.7	226	14.8
18–20.9	28	2.3	94	6.4	207	13.5
21–23.9	8	.7	40	2.7	112	7.3
24–26.9	5	.4	9	.6	34	2.2
27–29.9	3	.3	7	.5	27	1.7
30–34.9	4	.3	4	.3	12	.8
35–39.9	1	.1	2	.2	14	.9
40–44.9					5	.3
45–49.9						
50–59.9						
60–69.9						
80–above						
Total No. Children and Median Scores	1207	6.0	1473	9.9	1535	13.7

TABLE II.

Distribution, by grades, of scores, both whole numbers and per cents., secured by children in 19 cities using Test II of the Kansas Silent Reading Tests.

Scores Between	Grade VI		Grade VII		Grade VIII	
	No. of Children	Per Cent. of Children	No. of Children	Per Cent. of Children	No. of Children	Per Cent. of Children
0– 9	13	1.0	3	.2	1	.1
1– 1.9	9	.7	1	.1	2	.2
2– 2.9	17	1.3	7	.5	4	.4
3– 3.9	20	1.6	11	.8	8	.9
4– 4.9	35	2.8	14	1.0	4	.4
5– 6.9	89	7.1	41	3.1	30	3.3
7– 8.9	140	11.1	66	4.9	33	3.6
9–10.9	153	12.1	93	7.0	60	6.6
11–12.9	132	10.5	105	7.9	84	9.2
13–14.9	107	8.5	141	10.6	65	7.1
15–17.9	163	12.9	238	17.9	125	13.7
18–20.9	146	11.6	199	14.9	146	16.0
21–23.9	86	6.8	147	11.0	91	10.0
24–26.9	61	4.8	114	8.6	93	10.2
27–29.9	28	2.2	52	3.9	40	4.4
30–34.9	34	2.7	78	5.9	73	8.0
35–39.9	5	.4	19	1.4	25	2.8
40–44.9	2	.1	4	.3	18	2.0
45–49.9	7	.5	3	.2	7	.8
50–59.9	17	1.3	2	.1	3	.3
60–69.9						
70–79.9						
80–above						
Total No. Children and Median Scores	1264	13.4	1338	16.5	912	18.8

TABLE III.

Distributions, by grades, of scores, both whole numbers and per cents., secured by children in 19 cities using Test III of the Kansas Silent Reading Tests.

Scores Between	Grade IX		Grade X		Grade XI		Grade XII	
	No. of Children	Per Cent. of Children	No. of Children	Per Cent. of Children	No. of Children	Per Cent. of Children	No. of Children	Per Cent. of Children
0– .9	2	.4	3	.6				
1– 1.9								
2– 2.9			1	.2				
3– 3.9	3	.5	4	.8				
4– 4.9	2	.4			1	.3		
5– 6.9	7	1.2	6	1.2	3	.9		
7– 8.9	15	2.4	9	1.8	5	1.5		
9–10.9	25	4.1	8	1.6	9	2.8	1	1.1
11–12.9	32	5.2	14	2.9	14	4.3	1	1.1
13–14.9	35	5.7	15	3.1	14	4.3	3	3.3
15–17.9	68	11.0	54	11.2	34	10.6	8	8.8
18–20.9	83	13.4	41	8.5	19	5.9	6	6.6
21–23.9	63	10.2	46	9.5	28	8.7	6	6.6
24–26.9	87	14.1	72	14.9	54	16.8	15	16.6
27–29.9	44	7.1	39	8.1	35	10.9	10	11.0
30–34.9	69	11.2	77	16.0	50	15.6	20	22.2
35–39.9	28	4.5	46	9.5	24	7.4	6	6.6
40–44.9	23	3.7	30	6.2	20	6.2	10	11.1
45–49.9	19	3.1	12	2.4	8	2.4	3	3.3
50–59.9	12	2.0	5	1.0	5	1.5	2	2.2
60–69.9	3	.5			2	.6		
70–79.9	1	.2	2	.4				
80–above			3	.6				
Total No. Children and Median Scores	621	22.9	487	25.8	324	26.0	91	28.8

10, 11 and 12. Our work with the scores has shown us that although it was hoped that the values attached to the exercises in the three tests would make the scores secured comparable throughout all the grades, this is not exactly the case. In a group of 399 fifth grade children who took the test designed for grades 3, 4 and 5 and also the test for grades 6, 7 and 8 the median score of 13.46 was made on the test for grades 3, 4 and 5 while a median score of 11.66 was made by the same children in the test for grades 6, 7 and 8. It appears, therefore, that a difference in difficulty of approximately 2 points on a median score of 11 to 13 points is present in these two tests. Similarly 243 children in the eighth grade made a median score of 19.75 points on the test for grades 6, 7 and 8, but made a median score of 25.1 on the test for 9, 10, 11 and 12. These differences indicate imperfections in the values attached to the exercises. They do not, however, seriously invalidate the comparisons made among different members in the same class or among different classes of the same grade when tested by the same exercises. It does make it impossible to estimate the improvement between fifth and sixth grades or between eighth and ninth grades by the scores obtained by these grades in the tests, without making due allowance for the differences in difficulty of the three tests.

As an interesting study of the relative scores made by children in the various cities, Table IV is given. This represents the median score of all the children of a given grade taking the test in each city. Of course, in some cases only small numbers of children were tested while in other cities relatively much larger numbers were used, but even taking that into account, it is perfectly clear that the achievement in silent reading in some cities far surpasses the achievement in other cities. For example, the median scores obtained by children in the several grades of city G are little more than half the median scores secured by children in the corresponding grades in city A. Other surprisingly wide differences might be pointed out but a glance at the table will suffice to indicate that results as measured by these tests must depend to a considerable extent upon the varying practices which dominate the reading work in the various cities. Such a table as this one extended over a large number of cities and including a large number of children in each city would form the basis of an interesting study of the efficiency of various methods employed in teaching reading.

KANSAS SILENT READING TEST, MAY, 1915

Median Scores

	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
City A	7.6	13.3	13.8	19.7	19.1	18.7	21.8	25.6	26.4	
" B	8.3	7.25	14.6	13.3	18.0		20.8	33.6	42.2	34.4
" C	4.8	5.2	6.9	10.4	13.65	16.7	17.9	21.8	21.6	25.8
" D	3.0	7.9	11.7	13.0	15.8	18.0	21.6	21.7	27.2	
" E	4.7	8.2	15.0	12.8	15.1	15.0	22.9	20.25	20.7	29.0
" F	6.8	8.5	16.1	12.8	21.0	18.7				
" G	3.9	5.2	6.8	8.1	12.2	8.55				
" H	5.8	11.2	10.3	14.0	19.6	15.65				
" I	5.2	10.3	17.55	19.1	18.3	22.4	21.6	25.6	26.7	
" J	5.4	6.8	10.3	9.7	13.0	14.6	20.7	21.2		
" K	5.1	8.0	11.7	12.0	14.3	15.6				
" L	6.6	14.4	13.9	16.8	20.7	21.1				
" M	2.9	9.6	14.3	9.8	15.0	16.9	25.1	20.1	30.9	34.8
" N	6.8	13.7	17.3	15.3	16.8	23.05	25.1	25.15	25.5	31.5
" O	6.3	11.2	14.7	16.4	18.05	13.2				
" P	7.9	10.0	13.8	14.3	17.6	28.0	20.7	24.4	26.0	28.9
" Q	5.7	11.5	14.3	13.6	18.0	20.4	28.5	28.9	25.7	
" R	4.6	9.1	13.1	13.8	16.8	19.4				
" S	5.4	9.3	12.5	8.8	14.1	22.5				
Total tested	1207	1473	1535	1264	1338	912	621	487	324	91
Medians of totals	6.0	9.9	13.7	13.4	16.5	18.8	22.9	25.8	26.0	28.8

NOTE—The cost of the Kansas Silent Reading Tests, including Class Record Sheets, is 33 cents per hundred copies. Address the Bureau of Educational Measurements and Standards, State Normal School, Emporia, Kansas.

ELEMENTARY TESTS IN PSYCHOLOGY

CARL E. SEASHORE

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It is generally assumed that the blind are keener in hearing and touch than seeing persons are. Many marvel at the performances of the blind who walk about and feel at home, guiding themselves without the use of their eyes; and, when the blind person reads his braille with his finger-tips approximately as fast as we read with our eyes, they feel thoroughly convinced that here is a case of compensation in sensitiveness: in the absence of sight, his ear and his finger-tips have become more sensitive, for a seeing person is comparatively helpless in guiding himself by hearing or touch.

Through years of experience in the laboratory, the conviction has gradually grown upon me that a more radical distinction should be made between sensitiveness and ability to use a sense; *i. e.*, between inborn sensory capacity and acquired ability or skill. From time to time I have taken the opportunity of comparing my own sensitiveness in touch and hearing with that of blind persons distinguished for ability in guiding themselves by hearing and touch; and in no case did I find that the blind persons possessed any significant superiority to myself in sensitiveness to touch and hearing, although some of the blind persons experimented upon were noted for their wonderful performances through hearing and touch.

For about fifteen years we have been collecting data in the Iowa laboratory on the features involved in pitch discrimination; and, although we started out with all previous records and theories to the contrary, it has been abundantly proved that the test of pitch discrimination may be so elemental that there can be no improvement with practice and there will appear no significant variation with age, say from the age of eight to forty. So far as I know these data are the first clear-cut demonstration of the fundamental distinction which I wish to bring out here, namely, the distinction between psycho-physic sensibility and the apperceptive use of a sense.

We may say that a test is *elemental* when it is so simple and direct that no improvement can be made in the record by training. This is a new connotation assigned to the concept "elemental," for want of a better word. It follows from this definition that, within self-evident bounds, the record of an elemental test should not vary with age or phenomenal use of the sense.

It is evident that if such elemental tests are possible, the introduction of this concept into individual psychology must be of very great importance.

With this in view, we have undertaken in the Iowa laboratory to seek verification of this principle by two distinctive lines of experiment: first, by measurement of the effect of extraordinary use of a sense not ordinarily employed as in the case of hearing and touch by the blind; and, second, by a prolonged series of training in a test which is presumably elemental. The full account of these two experiments will be published in Volume VII of the University of Iowa Studies in Psychology. Here I shall merely announce the general conclusions and point out the practical significance of these facts for educational psychology.

I. The Comparative Sensitiveness of Blind and Seeing Persons

(Experiments by Tsoerum Ling)

The fifteen brightest pupils of high school grade who had been blind for more than five years were selected in the Iowa School for the Blind at Vinton. These were compared with fifteen pupils in the Iowa City high school, selected at random—merely by taking those who happened to have a convenient schedule for the experiments. On these two groups six measurements in touch, hearing, and the kinaesthetic sense were made, which are so simple and direct that they might prove elemental so far as this test would constitute any evidence. These tests were: (1) discrimination for the direction of sound, (2) discrimination for intensity of sound, (3) discrimination for lifted weight, (4) discrimination for passive pressure, (5) discrimination for active pressure, and (6) discrimination for two points in tactual space. Most painstaking efforts were made in the adaptation of apparatus and method to make these six measurements elemental by reducing them to simple, direct impression which could be reported by the most natural response, no skill in action of any kind being involved. In other words, the aim was to establish a

physiological threshold as distinguished from a cognitive threshold.

The physiological threshold is the actual psycho-physic limit of the organism as measured under the most favorable conditions —conditions so simple and direct that they may be complied with adequately without training. The cognitive threshold, on the other hand, is any threshold that is inferior to the physiological on account of lack of skill or some cognitive or other difficulty which might be overcome by information or training.

The general result of these accurate measurements on fifteen blind and fifteen seeing persons in groups of approximately the same age are easy to generalize: *The threshold of sensory discrimination in each of these six measurements is about the same for the seeing group as for the non-seeing group.* There are certain variations, for individuals as well as for the group, but they are fairly distributed on the two sides so as to justify the general statement just made.

In the light of popular opinion, in the light of the opinion of those who are specialists in the training of sensory defective, as well as from the point of view that has generally been taken in psychological measurements on individual differences, this result is rather astonishing. Yet when one considers the case in its true setting, it seems natural enough.

We are born with prodigious resources of which the psychophysic organism for sensory discrimination is a good illustration. We have so many avenues leading to the same goal, so many means of accomplishing the same object in sensory experience, that no individual, however accomplished, makes use of more than a very small portion of his native capacity for sensory discrimination in clearly conscious terms. The eye seems to be the most convenient and universal avenue of approach to the outer world; therefore, seeing persons use their eye in apprehending objects and *store up their experiences and form their habits* in terms of eye adjustments. Other sensory impressions accompany these and may substitute for them but ordinarily take a secondary role.

Under these circumstances two facts are to be noted: first, we have no evidence, experimental or otherwise, to prove that the psycho-physic capacity of the eye is enhanced by persistent use in the life of the individual; that is, the refractive system does not improve by practice and the retina probably does not become

more sensitive to color and brightness by use, although the meaning of impressions may grow enormously by training. And, second, we have no evidence, experimental or otherwise, to show that the ear and the tactual organs in the skin and muscles become less sensitive by non-use in *apperception* in the life-time of an individual so long as sense-stimuli are allowed to play upon these organs in a normal manner.

Take the case of the blind and the seeing, then. The blind store their experiences and carry their psycho-motor adjustments in other terms than sight. They use hearing, touch ,and all the other lower senses more than seeing persons do, but we have no evidence to prove that the basilar membrane (or any other mechanism) or the sense organs of any of the other senses are improved by such use. On the other hand, the experimental evidence here reported goes to show that native sensitivity, including both sensitivity and sensory discrimination as ordinarily used, remains constant under such conditions, other things being equal..

But it may well be claimed that even the most elemental of these tests involves a certain amount of power of observation which has been acquired by training. This is true, and for this reason no test can be made absolute. A child cannot react until his general power of application has developed to such an extent that he can say that he hears or does not hear, sees or does not see, a particular object placed before him and can do this with adequate application to the task. But the point is that this general ability involved in elementary sensory discrimination is so instinctive and so direct and simple that every normal child exhibits that ability very early. In the case of pitch discrimination, *e. g.*, we have found that, with bright children, such a satisfactory elemental test can be made at the age of five, while the dull child may not have acquired that ability at the age of ten.

If we ask, then, for an interpretation of the facts before us, it may probably be summed up in this: that the elemental sensory discrimination as one feature in the mechanism of the psychophysic organism is so thoroughly established through geological ages of adjustment that the extraordinary use of it in a single lifetime will not materially change its capacity. Learning, which represents stored-up experience, with the power of reproduction and elaboration, may shift from one sense to another in response

to the exigencies in the life of the individual without disturbing the relative sensitivity of the organs involved in all normal sensory life, and all the senses are continuously at play sufficiently to prevent a deterioration.

Indeed, these sensory discriminations manifest themselves in all the senses very early in infancy. I have observed four infants during the first ten days with reference to their localization of sound, and in all four cases a surprising ability to observe the direction of a source of sound was present as soon as the infant began to notice sound at all. The fact that this process is automatic makes it possible for us to use the sense of hearing in normal life without being aware of the actual extent to which we do use it.

The interpretation here given to immediate sensory discrimination makes necessary a revision of the conventional distinction between sensitivity and discrimination in experimental psychology. Ordinarily, discrimination is used in the sense of a judgment; but in the case of the elemental measurements here involved, the reflective process is reduced to a minimum and the test becomes essentially one of immediate sensory impression allied to that of bare sensitivity.

II. The Effects of Practice on Discrimination for the Intensity of Sound

(Experiments by Kwei Tan)

The above results of trials with the six tests do not constitute complete proof of the elemental character of these tests, although they point very strongly in that direction. The conditions under which they were given may, however, be considered fairly crucial. In order to get further specific proof in regard to the elemental character of these tests, an extended study was made on one, namely, the discrimination for the intensity of sound. The problem was merely this. The observer hearing two tones, one second apart, each lasting one second, was asked: Which was the louder?

Mr. Tan, having trained himself in the manipulation of this test, and having fitted it up in the sound, light, and jar-proof room of the laboratory, took thirteen advanced students and put them through a series of exercises consisting of the repeti-

tion of these measurements, determining how small a difference in the intensity of sound the observer could detect. This was the most effective form of training we could devise. Six of these observers continued under approximately uniform conditions for twenty hour-periods each, and the other six had slightly less, varying from thirteen to seventeen periods of training. In all cases, however, it seemed that the training was long enough to reveal whether or not there was to be any progressive improvement with practice. While there were individual fluctuations and slightly characteristic variations in the so-called practice course for different observers, his general conclusion was that, where we had control of the conditions and there were no disturbing influences present, *this amount of training yielded no evidence of improvement with practice.*

In other words, we have here a test which is elemental in the sense defined above, first, as evidenced by the apparent lack of modification by blindness, and second, by failure to improve with practice.

A third step remains to be taken, namely, to determine whether or not it develops with age. A considerable number of experimenters have made measurements on children and the general conclusion of these experiments is that there is improvement with age. But such was also the finding for pitch discrimination until the most recent experiments. This may perhaps be due to the failure to realize the significance of apparently trivial conditions in the test which will tend to make or unmake it as an elemental test. In other words, for want of experimental proof on children, I would make the prediction that we should probably find that, where the child is old enough to apply himself and does apply himself intelligently to the test—say from five to ten years of age, according to the brightness of the child—the records for these six tests which were tried on the blind would not vary with age.

The findings in these experiments constitute a challenge to a large part of current systems of mental tests. They demand that, before we attribute a developmental trait to a subject, we must ascertain that such a variable is not due to our failure to recognize the significance of making tests of capacity elemental.

ON THE CORRELATION OF THE MARKS OF STUDENTS IN MATHEMATICS AND IN LAW

H. L. RIETZ

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In a paper[1] entitled "A Study in Formal Discipline," Mr. F. C. Lewis draws some conclusions concerning the ability of students in mathematical reasoning and in law. He bases these conclusions on an examination of records of Dartmouth students, with a view of determining whether students of high standing in mathematics tend to have relatively high standing in law. He states his result in the following form:[2] "These tests are surely convincing of one thing, *viz.:* that students able in mathematical reasoning are not even generally able in practical reasoning and law."

I take it as obvious that such a conclusion should not be drawn if there is a significant positive correlation between the marks of students in mathematics and in law. The statistical analysis contained in the present paper shows that there exists a significant positive correlation between grades in mathematics and grades in law. In other words, students of high standing in mathematics tend to have higher standing in law than do students of average or of low standing in mathematics. Hence, Mr. Lewis has clearly drawn false conclusions from his data.

In describing his data, Mr. Lewis states that the records of ten different classes were examined. He published[3] as an example the marks of one class of twenty-four students. Attention has been called to the fact[4] that this example illustrates exactly the opposite of his stated conclusion, in so far as it has a bearing on the question under consideration. It is unfortunate that the grades of only one of the ten classes were published, as this omission of most of the data made immediate criticism practically

[1] School Review, Vol. 13, pp. 281–292 (1905).

[2] Loc. cit., p. 291.

[3] Loc. cit., p. 291.

[4] RIETZ AND SHADE, *Correlation of Efficiency in Mathematics and in other Subjects*, Illinois University Studies, Vol. III, No. 1, p. 19.

impossible. In fact, when relationships are treated by means of data involving as much variability as is shown by students' marks, good statistical practice demands that a tabular arrangement of the data be published along with the results.

Since the published example does not conform to the results stated, it seems important to obtain data from Dartmouth College in order to test Mr. Lewis's conclusions by a statistical analysis of such data. At the request of Professor C. N. Haskins, the administrative officers of Dartmouth College kindly furnished me with data on students taking courses in mathematics and law at Dartmouth from 1897–1901. The example of twenty-four students cited above is marked "Dartmouth 1897." With the hope of obtaining in part the same data that Mr. Lewis used, I have included students who took mathematics and law in 1897.

These data in the form of an average grade of each student for courses in mathematics and the average grade for courses in law are exhibited for separate classes in the correlation tables marked 1897, 1898, 1899, 1900, and 1901 (Tables I–V). As the mean grades for the various years do not differ by more than may reasonably be ascribed to random sampling, the data are next grouped to form a combined table (Table VI).

The following mean grades and correlation coefficients are obtained from data for various years and for the combined data:

	1897	1898	1899
Mean Grades in Math.....	71.7±1.2	73.1±1.6	72.6±1.2
Mean Grades in Law	73.6±1.1	77.9±1.2	70.6±1.9
Correlation coefficient.....	0.38±0.10	0.675±0.070	0.611±0.085

(*Continued*)

	1900	1901	Comb. data
Mean Grades in Math.....	75.3±1.0	75.8±1.5	73.7±0.6
Mean Grades in Law	71.7±1.2	75.0±1.4	73.8±0.6
Correlation coefficient.....	0.537±0.067	0.672±0.070	0.528±0.040

Each of the correlation coefficients for the separate years is a significant positive correlation. These correlation coefficients vary from $r = 0.38$ to $r = 0.675$, but such a variation is not unlikely under random sampling, with as small a number of

students as we have in a single class. The correlation coefficient $r = 0.528 \pm 0.040$ for the combined data should be especially noted.

These data thus show, in every case, a positive correlation. Though in each case the number of variates is small, yet the positive correlation coefficients found are nevertheless very significant. While the number of variates used in the tables for separate years is too small to warrant the calculation of the means of arrays, we find, from the combined table, except near the extremes, that the means of arrays lie fairly near the line of regression. We can therefore predict fairly well from the correlation coefficient the average grades of students in law for assigned grades in mathematics.

From an examination of Mr. Lewis's diagram of grades (p. 291, loc. cit.), I think it is somewhat likely that the error has come from emphasizing unlikeness and giving too little or no attention to likeness. This kind of error is very common where conclusions are drawn from personal impressions of relations. The method of treating his figure on p. 290 in which he exhibits the standing in mathematical reasoning and standing in what he calls "practical reasoning" is also open to serious criticism. Here, just as with the grades in mathematics and law, he draws lines placing grades that are decidedly different into prominence, without drawing also lines to put into similar prominence cases where grades are alike or nearly alike. Such a method is manifestly unscientific. In short, it seems that Mr. Lewis has again neglected to give due weight to likeness and has drawn a further incorrect conclusion from the data on mathematics and "practical reasoning."

TABLE I

Correlation of Marks in Mathematics and in Law

1897

Mathematics

Law \ Mathematics	50	55	60	65	70	75	80	85	90	95	100	Total
50												
55			1									1
60	1	2		1	1				1			6
65				1	1	1						3
70			1	1		1		1				4
75				1	2		2	1				6
80			1	1	2	1	1	1		1		8
85			1		3		1	2				7
90												
95												
100												
Total	1	2	4	5	9	3	4	5	1	1		35

Mean grade in Mathematics, 71.7 ± 1.2
Mean grade in Law, 73.6 ± 1.1
$r = 0.38 \pm 0.10$

TABLE II

Correlation of Marks in Mathematics and in Law

1898

Mathematics

Law \ Mathematics	50	55	60	65	70	75	80	85	90	95	100	Total
50		1										1
55												
60	1											1
65						1						1
70	2		1									3
75	1			2	1	1	2	2				9
80			1			2		1				4
85						1	2	1	1			5
90					1		1	1	1			4
95										1		1
100												
Total	4	1	2	2	2	5	5	5	2	1		29

Mean grade in Mathematics, 73.1 ± 1.6
Mean grade in Law, 77.9 ± 1.2
$r = 0.675 \pm 0.070$

TABLE III

Correlation of Marks in Mathematics and in Law

1899

Mathematics

Law \ Mathematics	50	55	60	65	70	75	80	85	90	95	100	Total
50		1	1			1						3
55					1							1
60			1	1	1		1					4
65							2					2
70			1	2								3
75							1	1				2
80				1								1
85				1			3					4
90							2		1			3
95												
100												
Total		1	3	5	2	1	9	1	1			23

Mean grade in Mathematics, 72.6 ± 1.2
Mean grade in Law, 70.6 ± 1.9
r = 0.611 ± 0.085

TABLE IV

Correlation of Marks in Mathematics and in Law

1900

Mathematics

Law \ Mathematics	50	55	60	65	70	75	80	85	90	95	100	Total
50		1		1			1					3
55			1	1	1	1						4
60			1		1		1	1				4
65			2				1		1			4
70	1		1	1	3	2		1				9
75					2	1	3	1				7
80						1		1	1			3
85						1	1	2	2	1		7
90					1		2					3
95										1		1
100												
Total	1	1	5	3	8	6	9	6	4	2		45

Mean grade in Mathematics, 75.3 ± 1.0
Mean grade in Law, 71.7 ± 1.2
r = 0.537 ± 0.067

TABLE V

Correlation of Marks in Mathematics and in Law

1901

Mathematics

Law \ Mathematics	50	55	60	65	70	75	80	85	90	95	100	Total
50				1								1
55		1		1								2
60		1	1									2
65				1	1							2
70						1	1		2			4
75			1		2							3
80				1		1	2	1				5
85					1	1	4			2		8
90										2		2
95												
100												
Total		2	2	4	4	3	7	1	2	4		29

Mean grade in Mathematics, 75.8 ± 1.5
Mean grade in Law, 75.0 ± 1.4
r = 0.672 ± 0.070

TABLE VI

Correlation of Marks in Mathematics and in Law

COMBINED TABLE—1897–1901

Mathematics

Law \ Mathematics	50	55	60	65	70	75	80	85	90	95	100	Total
50		3	1	2		1	1					8
55		1	2	2	2	1						8
60	2	3	3	2	3		2	1	1			17
65			2	2	2	2	3		1			12
70	3		4	4	3	4	1	2	2			23
75	1		1	3	7	2	8	5				27
80			2	3	2	5	3	4	1	1		21
85			1	1	4	3	11	5	3	3		31
90					2		5	1	2	2		12
95										2		2
100												
Total	6	7	16	19	25	18	34	18	10	8		161

Mean grade in Mathematics, 73.7 ± 0.60
Mean grade in Law, 73.8 ± 0.60
r = 0.528 ± 0.040

ADDITIONAL RESEARCHES ON LEARNING TO SPELL: THE QUESTIONS OF "TRANSFER" AND OF "DIRECT" VERSUS "INDIRECT" METHODS[1]

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The First Experiment

The problem of this experiment may be expressed thus: Is there any "transfer" of accuracy from words learnt in lists to cursive dictation embodying the words thus learnt? I use the word "transfer" in the sense in which it is used in pedagogical discussions of this question, especially in America, though from a psychological standpoint, "transfer" is not really involved at all. All that is meant is: Are words learnt in one "setting," so to speak, available in another?

The experiment was carried out with the whole of a Standard I class of 56 boys, of an average age of 7 years 5 months. Most of the boys could read fairly, but though they knew the names and sounds of the letters, their spelling was but little advanced. Twenty-four common words were taught in lessons lasting about fifteen minutes each in the early part of four afternoon sessions. The words were learnt in the following way: Each of the twenty-four words was written in script on large sheets of cartridge paper (11 in. x 15 in.). The boys were provided with paper and pens, and the first word was exposed to view. The experimenter spelled and pronounced the word, and the boys were told to spell it through as many times as they could, silently, that is, without audible articulation, though in actual practice, there was some muttering. After an exposure of 25 seconds the boys wrote the word on their papers. The next word was exposed and written in the same way and twelve words were thus dealt with in the first lesson. The next day the remaining twelve words were similarly dealt with. On the two following days the whole of the words were treated again in the same way.

After an interval of four days, the words were dictated as a list. The experimenter placed each word in a sentence thus: "Where are you going?" He called out the whole sentence and then said, "Write down 'where,'" and so on, throughout the list. On the next day the boys were told the results of their "list spellings," but no corrections were made and no further teaching was done, except to explain and illustrate the difference between "hear" and "here," which had been confused.

Two days later the following sentences, containing some of the words from the list, were dictated:

Will you *scrub* the table with *soap?*

Here is the *needle* and *cotton.*

I can *hear* a boy *read.*

Hang up the *towel* when you *finish.*

The "list words" are italicized. The time taken was 20 minutes.

In making the analysis, some of the words in the dictation were not counted. There were left 8 specially taught words and 11 words not so treated. The taught words were: scrub, soap, needle, cotton, hear, read, towel, finish. The untaught words were: will, you, the, table, with, is, and, can, boy, up, when.

For the whole group of 56 boys the average number of list spellings correct was 5.6 (68.6 per cent.), the average number of taught words correctly spelled in cursive dictation was 5.7 (70.9 per cent.) and the average number of untaught words correctly spelled in cursive dictation was 8 (72.5 per cent.).

The correlation-coefficient was worked out from the individual cases by the Pearson "r" formula between the accuracy of the "taught" words in the list and that of the same words in the dictation. It reached the high figure of + .897. It appears that the words were done better in dictation than in the list, but not much. The difference between the two averages is only .1, and the "probable error" of this difference, worked out on the formula "p. e." $= .67 \sqrt{\frac{\sigma_1^2 + \sigma_2^2 - 2r\sigma_1\sigma_2}{n}}$ is also .1. We are not justified, therefore, statistically, in asserting a general rise, since the difference between the means is less than "two or three times" its probable error.

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[1] This article is condensed from the author's manuscript of fifty-five pages. The author is not responsible for errors, omissions, or misstatements due to the condensation.—Managing Editor.

Conclusions

1. Words learnt by a direct method which can be written correctly in lists can also be written correctly among others in cursive dictation.

2. Easier words, not directly taught, are spelled as badly as much harder words, directly taught, so that even for the easier words some "direct" treatment seems advisable.

3. It is well-known now that children remember more some time after than they do immediately after a lesson, provided they have made efforts in acquisition. The slightly better result in the dictation may be due to this factor or to the practice involved in writing the list or to both. But the operation of the former factor may be small; since, in order to eliminate it to some extent, the list spellings were given four days after the lessons were over, and the dictation was given on the day following the list spellings.

The Second Experiment

This experiment dealt also with the question of "transfer"; but there were important differences from the first experiment. An attempt was made by means of equal, parallel and highly-correlated groups of boys to demonstrate the comparative results of "direct" and "indirect" teaching. And the words which were learnt were selected in such a way that they were indubitably words which were within the children's vocabulary, and which they could use with appropriate meanings in sentences of their own.

The class which did the work was a Standard I class of some 50 children in a senior department of an average age of 7 years 11 months. The majority of the boys had been working in this class for some nine months, though thirteen of them had been in the class but three months. On four successive days, from 3:20 to 3:50 p. m., immediately after the recreation interval, the boys wrote exercises involving productive imagination. Four words were written on the black-board in each case, and the children were told to write a story containing these words, a form of exercise quite new to them. I have previously pointed out the value of this form of test as a measurement of imagination.[2] Its defect as a mental test is the high improvability by

[2] W. H. Winch. *The Relation Between Substance Memory and Productive Imagination in School Children.* British Journal of Psychology. Vol. 4, 1911, 92–125.

practice of its productive aspect, but that will not affect the questions raised in this research; for I am now using it as a means of inducing linguistic expression in young children in order to find out the words they use and which of them they misspell. First of all, the spelling errors were marked on each paper. Then a tabulation was made in order to discover the words most frequently used and most frequently spelt wrongly. Finally, from the completed table, the following forty words were selected as satisfying these conditions:

went	sweets	know	caught
who	once	said	catch
father	eating	sitting	threw
mother	know	killed	used
when	played	flight	down
you	saw	house	pick
give	upon	time	bought
gave	see	little	with
some	have	buy	his
come	was	which	home

The forty selected words listed above were dictated to the class, and on the results obtained two parallel and highly-correlated groups equal in spelling ability (so far as these words are concerned) are formed.

The selected words were taught to the two groups by two different methods. The Head Master taught one group by a "direct" method, and an Assistant Master taught the other group by an "indirect" method. Each teacher believed in his own method and was enthusiastic about it. The lessons taken by the Assistant Master will be cited first.

The word "you" from the list was written on the blackboard, and the boys were asked to give orally sentences containing "you." Then the word "know," also from the list, was written and the boys were asked to form sentences containing "you" and "know." Then the word "father" was added, also of course, from the list, and then "who" and "bought" and "sweets." So the sentences would grow in this way. The words from the list are italicized.

1. *You* are a good boy.
2. *You know* my *father*.
3. *You know who* did it.
4. *You know who bought* it.
5. *You know who bought* the *sweets*.

From a number of such sentences given by the boys, one was chosen by the teacher and dictated slowly. In this case sentence number five was chosen. The boys all wrote the sentence looking at the board for the words "you," "father," "who," "bought," "sweets" if they were in any doubt about their correct spelling.

Then the words "which," "said," "saw," "fight," were dealt with in the same way, and the sentence selected for dictation was in this case "*Which* is the boy *who said* he *saw* a *fight*?"

"Once upon a time" (written as a phrase), "father," "went," "home," "which," "was," and "used" were next written and treated orally in the same way. The final sentence selected for dictation was "*Once upon a time* a *father went* to a *house* which *was used* by three bears."

Thus seventeen of the words from the list were written and used in the first lesson, some of them more than once.

The second lesson by the indirect method was given next day at the same time. Fourteen words from the list were written and used, six of them for the first time. The final sentences selected for dictation were:

1. *When* will *you knock* at the *house*.
2. *Which* boy *caught* a canary.
3. I *know* a boy *who was killed* in a *fight*.
4. *Knock* him *down* and *come* here.

The words italicized are, as usual, words from the list, several of them, it will be noted, have been used before.

A third and fourth lesson were given in a similar manner. In all these lessons the art of the teacher consisted in choosing words from the list that could readily be used together, and in pointing out peculiarities in the written words: for example, he would show that in "knock" the "k" is not sounded, in "know" that the "k" and "w" are not sounded, and that in "killed" the "d" sound at the end is spelled "ed." But no "direct" spelling was done either by the teacher or by the boys.

On the same days and at the same time of day the other of the two parallel, highly-correlated and equal groups was taught the words from the list by a "direct" method.

The forty words were written in script characters on separate sheets of cartridge paper (11 in. by 15 in.) with black crayon. Each boy was provided with a pencil and sheet of paper on which to write the words. The first sheet was exposed in such a way that all the boys could see the written word. The word was then, letter by letter, spelt slowly by the teacher, and pronounced without syllabification. The boys then spelt the word and pronounced it silently, as many times as they could before the sheet was removed. The method was supposed to be visual and silent, but in actual practice there was some amount of muttering. After 20 seconds the word was withdrawn and the boys wrote it as quickly as they could on their papers. Twenty seconds were allowed for writing and then the next sheet was exposed. A few seconds were lost here and there in recovering the attention of the boys, so that only 38 words were dealt with in the first lesson; it is quite possible that the lesson was somewhat too long.

On the second day 40 words were dealt with, in the third lesson 40 words were dealt with, and in the last lesson 45.

After a lapse of four days both groups were tested together. They were tested in cursive dictation in which the "list" words were embodied. The following were the sentences dictated: the "list" words are in italics,

1. I *saw* a boy *who said his mother gave* him *some sweets*.
2. My *father once upon* a *time went with* me and *caught* and *killed* a *little bird*.
3. *You come* to me and *see* me *pick* up the bird he *threw down*.
4. The boy *was sitting* at *home* in the *house*.

Twenty-seven of the "list" words are to be found in the above sentences. The time of the lesson, 30 minutes, having expired, the completion of the test was postponed until the following day. The sentences then dictated were:

1. *Give* me the apple *which I bought* and *you* are *eating*.
2. I *have played* the game.
3. You *knock* the ball and I *catch* it.
4. I *know* he *used* to *buy* cakes.
5. *When* did he *fight*.

In the preliminary tests the average mark for the pupils of Group A (taught indirectly) was 17.2, that for Group B (taught directly) was 17.8. The correlation coefficient, worked out

from the individual cases, is practically perfect, but there is a slight advantage on the side of Group B in the preliminaries which is several times greater than the probable error of the difference between the means. There is therefore, a general advantage, though slight, on the side of Group B. In the final tests—those in cursive dictation, in which the list words were included—there is a great advantage on the side of the directly taught group, though not found in the highest section of it. The average mark for Group A (taught indirectly) was 26.2 and for Group B (taught directly) was 29.9. The correlation-coefficient, worked out from the individual cases of Group A and Group B on the Pearson "r" formula, is + .875, and the probable error of the difference between the means is .71, the difference itself being 3.7, more than 5 times its probable error. Tested by cursive dictation then, the "direct" method has gained a victory over the "indirect" one, though the boys made a great advance by *both* methods, and we must remember that Group B had a slight but general advantage to start with.

In cursive dictation then, the "direct" method wins. But it is sometimes argued that, in original composition an "indirect" method produces better results in the spellings involved in composition, though in dictation it may not. This hypothesis is not very easy to test statistically, but it can be attempted.

TABLE I

Showing, section by section, the number of list words used, and the number spelt correctly in four preliminary and in four final tests in original composition, each word being counted as many times as it was used

No. of Marks in Preliminary Test of List Words	Group A (taught indirectly)					Group B (taught directly)				
	No. of boys	Prel. Tests		Final Tests		No. of boys	Prel. Tests		Final Tests	
		Av. times words used	Av. times corr. spelt	Av. times words used	Av. times corr. spelt		Av. times words used	Av. times corr. spelt	Av. times words used	Av. times corr. spelt
30 and over	3	25.3	23.3	36.0	36.0	3	22.0	19.3	24.7	24.7
25 to 30	4	31.8	23.3	32.5	28.0	4	32.5	26.8	31.0	30.0
15 to 25	5	35.2	21.8	34.2	27.8	5	29.8	19.4	43.6	41.4
10 to 15	3	25.0	14.7	18.3	16.6	3	27.3	15.0	31.3	24.6
0 to 10	5	22.0	12.2	28.0	19.2	5	9.4	5.0	16.0	12.0

Four exercises were given in half-hour lessons as before in which the boys were required to write a story containing some given words. These four exercises were examined, and lists were made showing how often the forty words which had been taught were used in an appropriate sense, and how often they were spelt correctly—a laborious but strictly necessary procedure.

Generally speaking, the boys taught directly won a decisive victory. Whereas, on an average in the preliminary tests, the boys of the "indirect" group used the list words 28.2 times, and spelt them correctly 18.9 times, whilst the boys of the "direct" group used them 23.7 times and spelt them correctly 16.6 times, in the final tests the figures are for Group A—the "indirect" group—30.2 with an average accuracy of 25.2 (83.6 per cent.), and for Group B—the direct group—29.5, with an average accuracy of 26.8 (90.8 per cent.). Not only are the boys of Group B much more correct in the finals—they were somewhat more correct in the preliminaries—but they have made a much greater gain than Group A in the freedom (only appropriate usage counts, be it remembered) with which they use the words in their own composition; for, whereas in the final tests in composition Group A has used the words on an average of 2 per boy in excess of their use in the preliminary tests, Group B has a corresponding figure of 5.8. A second tabulation of the final results was made, in which those list words which were sometimes right and sometimes wrong were rejected altogether, and list words used more than once were counted only once. The boys of Group B proved to be more accurate than those of Group A—they had, indeed, an average accuracy of 89.6 per cent. as against 83.8 per cent. in Group A.

Conclusions

1. Words taught by a "direct" method are remembered more accurately than those taught by an "indirect" method when tested by cursive dictation in which these words occur.
2. There is a greater gain in the freedom of appropriate usage and accuracy in original composition from a "direct" than from an "indirect" method of teaching spelling.

The Third Experiment

This experiment was carried out with the whole of a Standard III class of about 50 boys whose average age was 9 years 9 months. The boys had not spelt very well when tested by the Head Master in one of his examinations. During the year they had been taught by the aid of transcription, word-building, and the formation of easy sentences about well-known things.

It was decided to teach 60 words, and in order to be sure that the words were within the usable vocabulary of the boys, they were selected, as in Experiment II, from four pieces of original composition, written by the boys without assistance.

The errors in spelling were marked from the whole of the of the composition exercises, and were tabulated in the way already explained in Experiment II. The following words were selected as being those most frequently misspelt.

field	friend	received	enjoyed	said
shining	bought	motor	brought	because
want	sweating	until	policeman	searching
pennies	scrambled	remembered	ourselves	cousin
cricket	traffic	allowed	straight	brooch
biscuit	earned	didn't	knocked	bathe
bicycle	riding	hospital	enemy	chocolate
asphalt	whale	passed	through	arrived
session	whipped	examined	business	pail
surprised	struggling	piece	quite	Montagu St.
really	sword	medicine	service	bullets
climbing	drowned	caught	operation	carried

The selected words were dictated to the boys as a list. The Assistant Master called out a word, and the Head Master placed it in a short sentence orally. Then the boys wrote down the word. The class was then divided into two parallel and equal groups on the basis of the results.

The Head Master who taught one of the groups used a "direct method." In the first lesson he gave out orally the first word from the list, and called upon a boy to spell it. If the first boy failed, another boy tried. When the word was spelt correctly, it was written by the master in crayon on a large sheet of cartridge paper, and shown to the class. The Master then spelt and pronounced the word once, without syllabification, and the boys, looking at the sheet, spelt and pronounced the word twice. The work was rapidly done, since 52 of the words were spelt in the first lesson. In the second direct lesson an identical method

was adopted for the eight list words remaining, and after those words had been dealt with, the lesson became recapitulatory, the boys being called upon to spell individually, after and not before the word on the sheet had been spelt and pronounced by the master once, and twice by the boys collectively. In the third direct lesson, the boys spelt silently through the words exposed, one by one, for seven seconds, on the sheets previously mentioned and after the exposure wrote them quickly, one by one, on paper.

The Assistant Master, who taught the other group, used an "indirect method," almost identical with that used by him in *Experiment II*. I shall describe the first lesson only and merely indicate the others. The words "field" and "shining," selected from the list, were written on the blackboard, and the boys were asked to give orally, sentences containing these words. Then the words "bought" and "pennies" were treated similarly. The boys were now permitted to write down on a paper sentences containing these words. They were instructed to write either sentences which they had thought of for themselves, or which they had heard given orally. All four words could be placed in one sentence, and a few boys managed to do this successfully. Other words dealt with in the first lesson were: (2) hospital, piece, asphalt, traffic; (3) policeman, knocked, really, received; (4) bicycle, business, bought, brooch; (5) until, biscuit, enjoyed, because.

In the second and third lessons by an indirect method, a similar procedure was adopted with the remaining words. In all the lessons, as the words were written on the board, the teacher called attention to orthographical peculiarities. With "field" and "friend," and "received," he pointed out the rule about "ie" and "c"; in "shining" and "riding" that the "e" in "shine" and "ride" was omitted; in "went" that no "h" was used; in "pennies," that the "y" of penny was changed into "ies"; in "biscuit" and "bicycle" that the parts "bis" and "bi" meant two or twice; in "asphalt" that "ph" was sounded like "f"; in "surprise" that the word was sur-prise, not supprise; in "climbing" that the "b" was silent; in "shipped" that there were two "p's"; in "sword" that the "w" was not sounded; in "drowned" that the word was not drown-ded; in "until" that there was one "l" only; in "ourselves" that the word did not

end in "selfs"; in "knocked" that the "k" was silent, in "business" that the word was made up from "busy" and "ness"; in "brooch" that the "oo" sound was unusual; in "bathe" that there was an "e" at the end; in "carried" that the "y" of carry was changed into "i"; and in "passed" and "pail" distinctions of meaning were made between them and "past" and "pale."

The words which had been taught were dictated as a list, and the papers marked and tabulated. Then four exercises were given in original composition, similar to those which had been given for the preliminary exercises.

All the list words occurring in the boys' composition exercises were marked and tabulated, each word being counted as many times as it was used. As apparently the boys taught directly had again been victorious, the Assistant Master argued that, though the boys thus taught were better spellers immediately after teaching, nevertheless, his method produced the more enduring results. To test this issue, the list words were dictated again two months later.

The average mark for Group A (indirect) in the preliminary test was 39.2, and for Group B (direct) was 39.2. The correlation-coefficient, worked out from the individual cases of A and B was + .99; the difference between the means was .1, and the probable error of that difference was .15.

The average mark for Group A in the first final test was 49.1, for Group B was 57.3. The correlation-coefficient was + .51; the difference between the means was 8.2, and the "p. e." of the difference was 1.1.

The average mark for Group A in the second final test, two months afterwards, was 47.9 and for Group B 55.2. The correlation-coefficient was .70; the difference between the means was 6.3, and the "p. e." of that difference was .80. The groups were extremely well-balanced for a start, for we left out two or three boys who would not pair; and, though a few boys left during the experiment, we crossed out the corresponding boys in the other group, and so maintained an exact balance in the preliminary test in spelling. The result is a clear one, and shows a decisive victory for the directly taught group all along the line.

Another tabulation of the results showed that the gain both in freedom of usage and accuracy was greater on the part of the directly taught group than of that taught indirectly. Group

A used the words an average of 22.8 times with an average of 21.1 spelt accurately in the preliminary exercises, whilst Group B has corresponding figures of 27.6 and 25.5. The comparative accuracy is 92.3 as against 92.6 per cent. In the final exercises Group A used the list words 28.9 times on an average, with an accuracy of 27.7; whilst Group B has corresponding figures of 34.9 and 33.8. The comparative accuracy is 95.8 as against 96.7 per cent.

The Fourth Experiment

This class consisted of boys who were new to the school; their average age was 6 years, 11 months on March 31, at which date they had been sent forward from the Infants' school to the Senior boys' school. They were promoted from three classes in the infants' school, and were of varying educational attainments; but all of them could read a little and some of them could read quite well. Their teaching had been conducted on a "phonic" method, and most of them knew the "sounds" indicated by the literal symbols, but they had not been taught the alphabetic names.

It is commonly found in English infants' schools taught by a phonic method which does not use the alphabetic names of the letters that the children do, nevertheless, acquire the names, or some of them, at home or from other school children; and this was, to some extent, true here also, but not to the same extent, for there was practically no English reading in their homes, and their parents were foreigners. In the infants' school they had learned to copy words from the blackboard, writing on paper with pencils, but they had never written either words or letters from dictation, nor had they written with ink. As the scheme of work (each school makes its own syllabus in England) in the school requires from the boys of this "standard" (grade) at the end of the first half-yearly term, the writing from dictation of some five lines of printed matter, and also of some ten to fifteen lines of English composition, it was obvious that some way of combining writing with spelling was necessary.

It was thought that a very comprehensive test might be made if forty common words were dictated, selected from the exercises in original composition of a previous Standard I class in the same school. The results were not encouraging, the average number

of words correctly spelt was only 4.4 out of 40. It seemed rather doubtful whether two equal and parallel groups could be satisfactorily made from such poor material, but the attempt was made and proved successful.

The Head Master favored a direct method, the Assistant advocated an indirect method, and both of them thought, having regard to the relative inexperience of the boys in writing down words from memory, that a writing factor should be involved in both methods. The forty words by means of which the division into Group A and Group B had been effected were taught to both groups at the same time of day. The Head Master had written his words in script characters, one by one, on large sheets of paper. They were exposed one at a time, for 20 seconds each, spelt and pronounced by the Master without syllabification, then spelt visually (with some articulation) by the boys, and written from memory on paper. This procedure was adopted in all four of the Head Master's lessons, and the words were, in all, dealt with three times each. The Assistant Master taught by an indirect method which I have already described. He selected first one word, then another, and then another, writing the words on the black-board, and asking for oral sentences containing them. Finally he dictated the best sentence given.

On the following day at the usual time in the afternoon all the boys of this class were tested by the dictation of words. The Head Master called out the words thus, placing each one in a sentence; "'Pick,' pick up your pen, write 'pick,'" and the boys wrote down the words with ink.

Group A (indirect) began with an average of 4.5, and finished with an average of 9.4; Group B (direct) began with an average of 4.2 and finished with an average of 11.7; the correlation coefficient, worked out from the individual cases of Group A and Group B, in the preliminary test is + .98, the difference between the means is .3, and the "p. e." of the difference is .19, more than half that difference; the correlation coefficient in the final test is + .95, the difference between the means is 2.2, and its "p. e." is .5, the difference being more than 4 times its probable error.

The Fifth Experiment

The Head Master, who had taught throughout on a direct method, had come to the conclusion, during the course of his teaching, that the lesson in "direct" teaching had been somewhat too long for the most effective attention to operate throughout. So he proposed to try again with a fresh class, comparing the results of a direct with those of an indirect method as before; but instead of giving lessons of equal length by the direct and indirect methods, he now thought of shortening the time allotted to the direct method by giving just half the time in each lesson to that allotted to the indirect method.

The Head Master taught one group in the following manner. The 60 selected words had been written beforehand, one by one, on separate sheets in script characters. Exposing a sheet the Master spelt and pronounced the word once, with a slight pause at the syllables. The boys then spelt aloud and pronounced the word twice, also with a slight pause at the syllables. Thus the lesson proceeded for 10 minutes. Two more lessons were given on succeeding days. During the three lessons of 10 minutes each the 60 words were spelt through twice.

The Assistant Master conducted three lessons by his indirect method on the same days, commencing at the same time, but each of his lessons lasted 20 minutes. In the preliminary tests the boys of Group A (indirect) scored an average of 34.2; Group B (direct) scored an average of 34.1; the difference between the means is .1, the correlation coefficient between the two series A and B is + .99, and the "p. e." of the difference is .2. In the final tests Group A scored 44.8, Group B 50.7; the correlation coefficient is + .78; the difference between the means is 5.9, and its "p. e." is .8, less than one-seventh of that difference. The advantage is clearly with the direct method.

The Sixth Experiment

The school chosen for this experiment was a girls' school situated in a fairly good neighborhood in a London suburb attended by children of good ability. The whole of the teaching relative to the experiment was in this case carried out by the Head Teacher, who had a personal leaning toward the indirect rather than the direct method. The general plan of the experiment was the same as in those previously recounted, and involved

the whole Standard III class of about 50 children whose average age was 9 years 5 months. A passage was dictated, and on the basis of the results the girls were divided into two parallel and equal groups.

In the first lesson given in an indirect method, twenty words were dealt with in the twenty minutes. The word "Tuesday" was written on the blackboard; the girls were asked what was difficult in the spelling of this word, and they answered "ue." They were then requested to give a sentence orally containing the word "Tuesday." The word "excursion" was next written, and the children warned to write "sion" not "tion." Oral sentences were asked for containing this word. Then the word "country" was dealt with. Some of the girls pointed out that the "o" was not sounded. Then the word "aunt" was taken, and the girls said "u" in this word had the sound of "r." Sentences were asked for containing both the last words, and then sentences containing all four words. Of those given the following was selected and rapidly dictated: "I went on Tuesday for an excursion into the country with my aunt." In the second lesson the remaining twenty words were treated in a similar manner, and the third lesson, since all the words had been studied in lessons one and two, dealt with the twenty words of greatest difficulty.

In the direct lessons the procedure was as follows. The 40 words were written on 40 separate sheets of cartridge paper in large text script. Each word was exposed for 28 seconds. The teacher spelt the word slowly and distinctly, making a slight pause at the syllables, and then pronounced the word. The girls learnt by a visual silent method, and there was little, if any, audible articulation. All the words were dealt with in the first lesson. In the second lesson the teacher began at the end of the list, and in the third at the middle of the list, the 20th first, then the 21st, then the 19th, then the 22d, and so on.

The preliminary test was given to some 50 girls. Of these two could not be "paired," one girl having 39 words right and one having 3 only. In the results of the final test there were some suspicious figures. Three or four of the girls had made extraordinary improvement and they were questioned as to the working at the words out of school hours. Three of them were found to have done so, and they, and of course the girls "paired"

with them in the opposite group, were omitted. One other girl, liking the lesson, had managed to come in, on one occasion, to both the "direct" and "indirect" teaching; she and the girl paired with her were, of course, excluded.

Owing to excisions, the indirect group was slightly better in the preliminary test. Group A (indirect) scored an average of 25.5, against 25.3 for Group B (direct), the correlation-coefficient was + .998, the probable error of the difference between the means was .08, and the difference itself was .2, between 2 and 3 times as great as the probable error. Thus we are justified in saying that Group A was the stronger group originally.

In the final test the positions were reversed. Group A scored an average of 33.7. The correlation-coefficient is + .847, the difference between the means is 1.9, and its "p. e." is .5, about one-fourth of that difference. The average age of the two groups was identical.

The Seventh Experiment

It remained to be seen whether similar or different results would be obtained with a higher class in the same girls' school; and whether the adoption of a test involving rather more literary expression and containing words which were not so fully within the usable vocabulary of the children would produce a variation in the results.

The experiment was carried out with the whole of a class (Standards V and VI) of 56 girls whose average age was 11 years, 9 months.

The test consisted of a dictation exercise given out in three sections, (a), (b) and (c). The experimenter read the first section, and then dictated it, phrase by phrase. Then the second section was read and dictated in the same way; and finally, the third. Forty-five words were selected for subsequent teaching. The final test was the same as the preliminary, and was administered in the same way.

On the results of the preliminary test the girls were divided into two equal and parallel groups. All the teaching and testing was done by the Head Mistress, who had had years of experience in experimental work with school children. The "indirect" lessons were given as follows: In the first lesson, the words *cathedral, eminence, situated,* and *centre* were written on the black-

board, and the children were asked for meanings (where necessary) and for comments on the difficulties involved in the correct spelling of the words. In the case of cathedral, a girl suggested that the "c" might be changed into "k." The meaning of *eminence* was explained, and it was pointed out that the termination was "ence" not "ance." No comment was made in *situated;* but in considering the word *centre* it was pointed out that in England the termination of the word was "re," and not, as might have been expected, "er." Oral sentences were asked for containing all four words and the following sentence, given by one of the girls, was rapidly dictated.

"The eminence upon which the cathedral was situated was in the centre of the town."

So the lesson proceeded with words written on the blackboard, comments, oral sentences, and sentences dictated. The second lesson was identical in method with the first. At the conclusion of the second lesson, as there was a little time to spare, the words *jealously, clangour, machinery* and *precincts* were dealt with a second time.

The direct lessons were given as follows: The words were written on separate sheets of cartridge paper, and exposed, one by one, to the class. The teacher spelt the word slowly and distinctly, with a slight pause at the syllables, and then pronounced it. The children learnt the word silently and visually. Each exposure lasted about 26 seconds. All the words were dealt with in the first lesson, and again, in exactly the same way, in the second lesson. We started with 56 girls, but four could not be "paired," and two were away on the day of the final test, so that the girls "paired" with them had necessarily to be excluded also, thus leaving 48 cases for final tabulation. The absences threw the preliminary balance of the groups out a little since the "paired" children were not individually quite equal. The average preliminary score was, for Group A, 30.8, and for Group B, 30.5. The correlation-coefficient, worked out from the individual cases of the two groups, was + .984; the difference between the means was .3, and the "p. e." of this difference was .14. Thus the balance was in favor of Group A in the preliminary tests.

In the final tests the balance of advantage shifted to the other side. The average score for Group A was 37.9, and for

Group B, 39.0; the coefficient of correlation was + .59; the difference between the means was 1.1, and the "p. e." of this difference was .51.

Thus a difference of twice its probable error in favor of Group A in the preliminary tests has been transferred to Group B in the final tests.

The Eighth Experiment

This experiment was carried out with the whole of a class numbering 54, of Standard IV children (girls) whose average age was 10 years, 6 months. The test consisted of 50 difficult words embodied in continuous prose. The passage was dictated in three paragraphs, the first paragraph being read and then dictated phrase by phrase, then the second and the third. The girls' papers were marked on the results of the test and two equal and parallel groups were formed.

All the teaching was done by the same teacher, namely, the Head Mistress, who was a skilled experimenter with a leaning towards an "indirect" method. The preliminary test was given to 54 girls; but 4 of them would not "pair," so that 25 only were placed in each group. We were fortunate in having no "absentees" throughout the experiment, so that the results of all the 50 children were available for tabulation.

The average preliminary score was, for Group A (indirect) 23.8, and for Group B (direct), 23.8. The correlation-coefficient, worked out between the individual cases of Group A and Group B, was + .99, and the "p. e." of the difference between the means was .05.

In the final test Group A (indirect) scored 37.4, whilst Group B (direct) scored 44.5. The correlation-coefficient between the A series and the B series was + .65, the difference between the means was 7.1, and its "p. e." was .87, one-eighth of that difference.

The average age of Group A was 10 years, 6.5 months, and of Group B was 10 years, 7 months.

Summarized Conclusions from the Eight Experiments

1. In eight different classes, ordinarily taught by eight different teachers in two schools of different sex and social type, a "direct" method of teaching spelling has proved superior to an "indirect" one.

2. Words learnt by a direct method which can be written correctly in lists can also be written correctly among others in cursive dictation or original composition.

3. It appears from the second and third experiments that there is a greater gain in the freedom of appropriate usage in original composition from a "direct" than from an "indirect" method.

4. It appears from the fifth experiment that lessons by a "direct" method may be shorter than those by an "indirect" method, and yet be more profitable.

5. It appears from the fourth experiment that the balance of advantage, even after the lapse of two months, is still markedly in favor of the "direct" method.

COMMUNICATIONS AND DISCUSSIONS

REPORT OF THE TWENTY-FOURTH ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION, CHICAGO, DECEMBER 28–30, 1915.

The program of the Twenty-fourth Annual Meeting of the American Psychological Association comprised some seventy addresses, ranging all the way from psychology in its relation to philosophy to psychology in its applied aspects. Parallel sessions were held throughout most of the program and the notes here given are drawn from those only which the writer attended and are further limited to those considered of special interest to educational psychologists. The address of the President, John B. Watson, upon "The Place of the Conditioned Reflex in Psychology," and many other addresses equally profound and inspiring to the general worker in psychology are not included.

Several papers emphasized the growing interest in tests for determining vocational fitness. F. Lyman Wells and Walter Dill Scott brought out the importance of comparing the experimental status of a group or of individuals with their later careers. Scott proposed, in his paper upon "Experiments on Vocational Selection," two means of checking up test results: (1) by testing employees whose ability is known to the employers, and, (2) as mentioned above, by examining applicants and correlating their standing in tests with success after employment. Correlations as high as .90 were obtained by use of the former method.

Mental age tests and problems concerning the feeble-minded occupied a large part of the program. Augusta F. Bronner made very clear a point too little recognized, that attitude materially affects performance on tests. Much may be revealed by a child who wilfully fails in a test, but obviously the revelation is not that of feeble-mindedness. Criteria of dissimulation are much needed in practical mental diagnoses.

J. B. Miner proposed a "Percentile Definition of Intellectual Deficiency." To call the least intellectual ½ (or some other) per cent. of the population "feeble-minded" has the decided advantage of giving an objectivity to the term "feeble-minded" that the usual definitions

in terms of economic and social self sufficiency, or in terms of years of retardation, do not give. The number of years retardation before an individual may be proclaimed feeble-minded varies with age, as does also the value of the intelligence quotient proposed by Stern. It is reasonable to believe that the percentage definition would not be subject to this objection. It is also a definition that would be readily compehended by the layman.

The percentile method of locating the standing of children was used to very excellent advantage by Helen Thompson Woolley and Charlotte Rust Fischer in their study of the "Comparative Rank in Mental and Physical Tests of 14 and 15 year-old Working Children with 14 and 15 year-old School Children." The most striking of the results shown was that the school group stood above the working group in all tests, physical as well as intellectual.

J. E. Wallace Wallin, in his paper upon "Who is Feeble-Minded," criticized the acceptance of failure to pass Binet age 12 as evidence of feeble-mindedness, showing that many successful housewives and farmers do not rank up to that age. Wallin suggested Binet age 9 as a reasonable limit. The discussion showed the existence of quite general opposition to accepting Binet age 12 as the lower limit of normality.

Joseph W. Hayes' study comparing the "Binet-Simon Method of Measuring Intelligence with the Yerkes-Bridges Point Scale Method," showed that in the earlier years the Binet results fitted more closely to the chronological ages of normal children than the Yerkes-Bridges results and that from eight or nine on, the Yerkes-Bridges method gave the better results, the disagreement being quite plainly due to to the difference in methods of scoring and not to differences in test questions.

Samuel G. Kohs considered "The Distribution of the Feeble-Minded Arranged by Mental Age (Binet)," and gave as the result of his calculations the estimate that about 54% of the feeble-minded are at large, about 30% in institutions for the feeble-minded and about 15% in penal institutions.

Karl T. Waugh gave some results of "Mental Tests of College Students as Freshmen and as Seniors." The improvement in attention (cancellation test) of the college seniors over their standing as freshmen was 4.6%; in speed of learning 4.2%; in association 2%; in range of information 44.7%; in class standing 19%. These results are highly suggestive of the kind of traits influenced by a college education.

Rudolf Pintner reported progress in standardizing some 15 performance tests, which are independent of language. A scale of such tests will be very serviceable in examining non-English-speaking individuals, or those of poor language endowment. The tests thus far standardized are: Feature Profile, Manikin, Five Figure Board, Two Figure Board, Casuist Form Board, Seguin Form Board, Adaptation Board, and Healy's Five Block Frame Test.

Daniel Starch presented "A Scale for Measuring Ability in Arithmetic." This consists of twelve problems, scaled for difficulty upon the basis of percentage of pupils who passed them. The distributions for grades four to eight are very much like the distributions in other traits which have been measured. Decided overlapping from grade to grade was shown. Approximately 33% of any grade reach or exceed the median of the grade above. An unusually strong sex difference was revealed—approximately 60% of the boys reaching or exceeding the median of the girls.

The exhibit and description of laboratory material held several features of educational significance. Truman Lee Kelley presented a test of initiative (described in the January number of this JOURNAL). W. V. Bingham presented a learning test and two spatial relations tests. The latter are tests demanding the kind of talent a mechanic must have in reading working drawings, or in interpreting two-dimensional data into three-dimensional facts. Such a test should prove of value in determining vocational fitness. C. L. Hull presented an exposure apparatus used in "A Quantitative Method of Investigating the Evolution of Concepts." The experiment described gives a means of noting the mental stages in the dropping out of irrelevant material as a concept of an element common to many situations is gradually built up from repeated experience with the various situations in which it is found.

Joseph Jastrow contributed to "The Study of Judgments" in showing that reliable aesthetic, moral and other judgments may be obtained from the consensus of opinion of a jury of a certain size. For example, the offensiveness of grammatical errors, slang expressions, etc., may be measured, for it was shown that judgments of these things are by no means random.

Herbert Woodrow and Frances Lowell have extended the use of the Kent-Rosanoff association list and methods, by drawing up "A Childrens' Association-Frequency Table." Unfortunately the method was not that of oral reaction, but the results strongly suggest, if

indeed they do not prove, very material differences between children and adults in types of association.

In a rather taxing learning experiment, involving motor co-ordination, which largely eliminated the factors of experience and environment, W. H. Pyle showed that 92% of white children exceed the negro average. It appears that negro children have from $\frac{3}{4}$ to $\frac{4}{5}$ the learning capacity of white children.

An analysis of typewriting habits shows that certain letter combinations are much more frequent in ordinary usage than others. Working with a group along this line M. E. Haggerty reported that typewriting practice of these most needed combinations of letters resulted in much more rapid improvement than that resulting from the usual procedure.

Frank M. Freeman and C. T. Gray reported intensive studies of handwriting and reading respectively. The use of moving pictures and of a hand-tracer in making possible the study at leisure of the rapid motions and the fine adjustments in writing and the use of a two-lensed camera, operated synchronously with a phonograph, to record the eye movements, vocal adjustments and time elements in reading, give promise of enabling an analysis that will show the motor correlates of good and poor reading as well as suggesting the psychological concomitants.

The following resolution, introduced by G. M. Whipple and of interest to all engaged in mental testing, was passed at the business session:

"Whereas psychological diagnosis requires thorough technical training in all phases of mental testing, thorough acquaintance with the facts of mental development and with the various degrees of mental retardation, and, whereas there is evident a tendency to appoint for this kind of work persons whose training in clinical psychology and acquaintance with genetic and educational psychology are inadequate, be it resolved: That this association discourage the use of mental tests for practical psychological diagnosis by individuals unqualified for this work."

The very excellent report of the committee on the Academic Status of Psychology, covering "The Academic Status of Psychology in the Normal Schools," was submitted in printed form. This report supplements that of the same committee last year upon the status of psychology in colleges and universities. It gives information con-

cerning the training of instructors in psychology and the methods of teaching this subject in normal schools.

The addresses upon "The Relation of Psychology and Pedagogy" raised issues confronting every growing department of education. M. E. Haggerty presented a course of study offered by the University of Indiana and particularly recommended it as a preparation for advanced research work in education. It included elementary, experimental, educational and other courses in psychology. C. H. Judd dealt particularly with courses in education for the prospective teacher. One fundamental thesis laid down was that general psychology has failed to give a scientific background for scientific activities in school practice. The reasons for this are: (1) Psychology does not deal with those problems that must be faced by the teacher. General psychology is too broad—unless application of psychological principles to educational situations is made by the teacher, it is not made. There is a great difference between courses that are applied to education and courses in which it is hoped students will make the application. Students do not and can not make the applications. (2) The beginning education student needs, in the first course, to be made aware of the problems of education and to be given specific facts which will contribute to the solving of those problems. (3) The disputes within psychology itself draw the attention of prospective teachers away from its educationally valuable and discovered facts. Judd apparently agrees with Haggerty in the value of general psychology for the leaders in educational science, but proposes "educational psychology," or perhaps better "experimental education" for the rank and file of teachers.

TRUMAN LEE KELLEY.

University of Texas.

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EDITORIAL

THE SOCIAL SCIENCES

It is a healthy indication that the subject matter taught in our schools is being subjected to an increasingly critical scrutiny. It is only recently that we have begun to realize the extent to which our curricula depend on tradition, and to consider whether the traditional subjects are the best possible ones for the development of boys and girls to take their places in a modern social world. The opinion has been frequently expressed in these columns that there are fundamental lines of education that should find a place in every course of study. These are English, the natural sciences, the social sciences, and art. All of these are relatively modern in their appearance in school curricula, and the social sciences have been among the most recent. There is a growing conviction on the part of school administrators and others interested in the development of schools that not enough attention is being paid to the social world in which we live. The phenomena of society are just as detailed and specific as are those of the natural world, and, in the opinion of many, are of even greater importance for the successful conduct of practical affairs.

There are many problems in the teaching of the social sciences that call for investigation. To begin with the elementary school, how much time should be devoted to the study of history in the different grades, and what should be the nature of the history work in each of these grades? Anyone who has had much to do with young children knows how eager they are for stories, and many of the more dramatic incidents of history can be taught even in the kindergarten. The efforts of the Herbartians to construct a school program on the basis of the theory of recapitulation had at least the merit of emphasizing social relationships, and inculcating a thorough understanding of the development of social activities. It is undoubtedly a mistake to attempt to teach fourth grade children the philosophical significance of the French Revolution, but the dramatic events of that period will be seized upon and worked over with great avidity by pupils of that age. Most elementary schools now provide for a certain amount of local and national history, but it is a question whether large world movements might not profitably be opened up at some point in the elementary course. Many of the reforms in the teaching of geography have aimed to place a greater emphasis on the social results of man's relation to the earth, but there is little danger that this point of view will be over-emphasized.

In the high schools much has been done in the past twenty-five years to provide an opportunity for a thorough and extensive study of history. Unfortunately, however, much of the history teaching is of the static, cross-section type, and there is a generally recognized need for a greater socialization of the history work. Moreover, it is difficult to see why certain phases of economics and sociology and even of psychology might not be taught to high school pupils with much greater profit than is realized from the traditional work in mathematics and languages. The types of courses in these subjects that are best adapted to stimulate the thinking of boys and girls of high school age are still matters to be worked out. Modern physiology, while primarily a natural science, is quite properly presented in the high school with strong leanings to social hygiene, and thus partakes of the nature of a social science. With the keenly awakened and rapidly developing sense of social values in the community at large there is certainly need for greater attention to the amount of time devoted to the social sciences in our courses of study and to the way in which these subjects may be most advantageously presented.

J. C. B.

NOTES AND NEWS

At the University of Iowa Professor Carl E. Seashore is developing a series of tests to facilitate the discovery of musical talent in the public schools. While most of these tests must be made upon a single individual at a time and with accurate instruments, many of them may be made in a large class room with fifty, a hundred, or even five hundred students at a time. The plan is to use the class room tests for preliminary findings and then employ the finer individual tests upon the few most interesting and significant cases which are caught in this first drag-net. Among the class tests are quantitative measurements on the ability to hear pitch, tonal memory, the sense of consonance, tonal imagery, and the time sense. These are fundamental and are quite certain to reveal the presence of unusual talent or conspicuous absence of talent. At the present time such measurements are being made on a class of three hundred university students, for each of which a musical talent chart will be made out, and cases of special interest may be investigated in greater detail. During the second half year it is planned to continue on a large scale the measurement of children of the various grades in the public schools of Iowa.

In the Horace Mann Elementary School, New York City, extensive use has been made during the past year of standard scales in school subjects to establish norms of improvement in the work of the grades. The Courtis Standard Tests in Arithmetic were used both at the beginning and at the end of a period of intensive drill on the fundamental operations. Marked improvement was noted in each grade although the pupils failed to reach the Courtis standards. Norms were also established in spelling by the use of the new Ayres spelling scale, in composition by the Hillegas scale and in reading by the Thorndike tests. Further details in regard to these norms may be found in the dean's Report, Teacher's College Bulletin, October 23, 1915.

At the University of Indiana Professor H. G. Childs has devised a series of algebra tests arranged on the principle of the time limit, similar to that used in the Courtis tests in arithmetic. There are twelve of these tests, including subtraction (two minutes), multipli-

cation and removal of parentheses (one minute), solving equations involving but one process (one minute), division (six minutes), transposing terms (one minute), collecting terms (two minutes), stating simple problems in the form of equations (four minutes), clearing of fractions (three minutes), solving simple equations (ten minutes), factoring (three minutes), elimination and solving simultaneous linear equations (five minutes), and stating problems in the form of equations (ten minutes). The net working time for the entire series is thus forty-seven minutes. Score cards have been worked out for each test to indicate the number attempted and number right, and the distribution of the results in a given group of pupils.

The National Associated Schools of Scientific Business, Sherwin Cody, Managing Director, a Chicago organization, has issued an interesting booklet entitled National Business Ability Tests. The tests include a reliability test, indicating the faithfulness of performance of school tasks on thirty successive school days, an attention test involving the cancellation and otherise marking of certain digits in a given time, a memory test with department store sales slips as material, the Courtis arithmetic tests, series B, tests in fractions and percentage, elementary and advanced spelling tests from the Ayres lists and other sources, elementary and advanced grammar tests, copying addresses, card filing, mimeograph work, shorthand and typewriting, business papers, and letter writing. The tests give evidence of considerable acumen in their selection and arrangement, and a study of the results of their application to a considerable number of people would be of great interest.

An interesting score card for school buildings and equipment for city elementary and high schools has been devised by Professor Burt W. Loomis, head of the Department of Education, Tarkio College, Missouri. The score card embraces four general rubrics, as follows: (1) site (160 points), (2) general features of plant (285 points), (3) school rooms (400 points), (4) special rooms (155 points), total 1000 points. Each of these rubrics is divided and subdivided, and the number of points for a perfect score is indicated with each sub-head. No explanation is given of the way in which the number of points was assigned to each particular subdivision. The scheme offers an excellent starting point for a comparative study of school buildings and for an experimental determination of the relative values of the different topics.

The St. Louis School of Social Economy under the direction of Dr. George B. Mangold, offers an attractive program of lecture courses for the second semester of the current year. As titles of the courses we note Child Problems, Organization and Functions of Social Agencies, Labor Problems and Social Reforms, the Practice of Organized Charity, Visiting Institutions and Social Agencies, Neighborhood and Group Work, Subnormal and Feeble-Minded Children, and Women and Industries.

An elaborate survey of the educational institutions of the State of Washington was authorized by the last legislature. The survey will be under the immediate direction of F. P. Capen, specialist in higher education in the Federal Bureau of Education. The following prominent educators will be called into conference in the course of the survey: Dr. P. P. Claxton, Federal Commissioner of Education, President Hill of the University of Missouri, President Pearson of Iowa State College, and President Seerley of the Iowa Normal School. The survey will be concerned particularly with the financial aspects of education, but will also investigate such problems as the entrance requirements of the high schools, the segregation of boys and girls in the high schools, and the extension of vocational training courses.

Under the supervision of Dr. David Spence Hill, Director of the Division of Educational Research, all the elementary school pupils of New Orleans have been given the Ayres Spelling Test as originally used in Springfield, Illinois. The results of the test, including papers from over twenty-five thousand children in seventy-eight different schools, are being tabulated by the graduates of the New Orleans Normal School. The results when completed will constitute one of the most extensive systematic studies of spelling that has yet been undertaken.

We learn from Professor Bingham that the department of psychology in the Carnegie Institute of Technology will add to its staff next September Dr. Kate Gordon, who is at present head of the department of education in the Bryn Mawr graduate school. Dr. Gordon will teach educational psychology in the Woman's Vocational School and esthetics in the School of Applied Design. She will also co-operate with the Bureau of Mental Tests in its task of helping the students to choose their courses wisely.

Arthur J. Jones (Ph. D. Teachers College, Columbia), Professor of Education at the University of Pennsylvania, is organizing a department in the History of Education at Swarthmore College. Since the new department of Psychology and Education was organized at the College, over a hundred students have completed the professional requirements of 18 college hours or more with from six to twelve weeks of practice teaching in the high schools of the community.

During the spring semester and summer session of this year, Professor E. P. Cubberley, of Stanford University, will give courses in school administration at Teachers College, Columbia University. Professor Lewis M. Terman will be acting head of the department of education at Stanford during his absence.

Dr. J. K. Hart, for a number of years a member of the department of education at the University of Washington, who is taking a year's leave of absence, has decided to teach a rural school for the year for the purpose of studying at first hand the problems of the rural school.—*School and Society.*

Dr. John W. Todd, of the University of North Dakota, has been given a leave of absence to act as head of the department of psychology at the University of Indiana. Professor John Winter, of Goshen College, takes Dr. Todd's work at North Dakota.—*School and Society.*

Dean Lotus D. Coffman, of the college of education of the University of Minnesota, has been engaged by the General Education Board to make a survey of the facilities for the training of rural teachers.—*School and Society.*

Dr. B. R. Buckingham, chief statistician of the Board of Education, New York City, well known for his study of "Spelling Abilities," has accepted the position of chief statistician to the new Wisconsin State Board of Education.

A CORRECTION

The Managing Editor wishes to call attention to an error of the compositor in Mrs. Edwina Abbott Cowan's article "An Experiment on the Influence of Training on Memory" in the January number of this JOURNAL. On pages 37 and 38 in both Table II and Table III the subjects on the left hand side of the table should have been marked "Trained Subjects," while those on the right hand side of the table should have been marked "Untrained Subjects."

PUBLICATIONS RECEIVED

W. S. DEFFENBAUGH. *School Administration in the Smaller Cities.* Bulletin, 1915, No. 44. Washington: Bureau of Education, 1915. Pp. 240.

This bulletin is based upon 1300 replies received to a questionnaire submitted to superintendents in cities having a population of from 2500 to 30,000, and upon material collected through visits to a number of schools in these cities. The discussion of the school board includes such topics as its size, method of selection, length of term, qualifications, committees, providing buildings and grounds, making wider use of the school plant, establishing vacation and evening schools, providing special classes, establishing the length of the school day, and supplying text books. There are chapters on school finances, the functions and tenure of the superintendent, the duties of principals and supervisors, the status of teachers, the health inspector and school nurse, and other employees and officers. Over 100 pages are devoted to statistical tables.

FLOYD CARLTON DOCKERAY. *The Effects of Physical Fatigue on Mental Efficiency.* The Kansas University Science Bulletin, Vol. IX, No. 17, September, 1915. Pp. 197–243.

The tests of mental efficiency employed were four in number—an addition test, a multiplication test, an attention test, utilizing telegraph sounders, and an association test, with nonsense syllables as stimuli. The physical fatigue was produced in various ways, *e. g.* by work with a wall machine in a gymnasium, by running on an indoor track, cross-country running, work with the ergograph, and walking. There is a discussion of the significance and reliability of each of the tests as an indication of mental efficiency and fatigue, and a brief study of the curve of mental work. The author concludes that the effect of physical fatigue upon mental efficiency is very irregular, especially as shown by the addition and multiplication tests. The sounder and association tests present more uniform results. There is a bibliography of fifty numbers.

AURELIO M. ESPINOSA AND CLIFFORD G. ALLEN. *Elementary Spanish Grammar.* Cincinnati: American Book Co., 1914. Pp. 367.

This grammar is constructed on the traditional model with lessons presenting various aspects of grammatical usage, a vocabulary, a bit of text for translation into English, conversational exercises on

this selection, and English sentences which are to be turned into Spanish. There is nothing novel or radical in the way of method, and on that account the book will be found very serviceable by those who believe that a language ought to be approached through the gateway of its grammar. The book contains numerous illustrations and maps.

GERTRUDE E. HALL. *Report upon the Standardization of Eleven Mental Tests.* Bulletin No. 5 of the Eugenics and Social Welfare Series of the New York State Board of Charities. Albany, N. Y., 1915. Pp. 459–545.

The tests referred to are the form board, two construction tests, the making of a paper drinking cup from directions, a tapping test, cancellation of digits, recognition memory, fidelity of report, pictorial completion, telling time, and antonyms. In the form board test Goddard's procedure was used and comparative tables are given, showing the results obtained by previous investigators, and those from the bureau's studies of over a thousand individuals. Both the construction tests follow Healy and Fernald. The tapping test is one used by Healy at the suggestion of Whipple, and the recognition memory, fidelity of report, pictorial completion, and antonyms tests are all after Healy. The scores are tabulated both according to physical age and to mental age as indicated by the Binet scale. Under each test after the presentation of results there is an interesting discussion of the value of the test for mental measurements.

ELLSWORTH HUNTINGTON. *Civilization and Climate.* New Haven: Yale University Press, 1915. Pp. xii, 333. $2.50.

"This volume is the product of the new science of geography. The old geography strove primarily to produce exact maps of the physical features of the earth's surface; the new goes farther. It adds to the physical maps an almost innumerable series showing the distribution of plants, animals and man and of every phase of the life of these organisms. Among the things to be mapped human character as expressed in civilization is one of the most interesting and one whose distribution needs explanation." The essential thesis of the book is that civilization is largely the product of the stimulation produced by climatic influences. Of these climatic influences probably the most potent in their stimulating effects are wind-storms. The development of this thesis and the massing of evidence in its favor gives rise to a series of most important and entertaining discussions. The book is a scholarly production and gives a new interpretation of the science of geography.

CALVIN N. KENDALL AND GEORGE A. MIRICK. *How to Teach the Fundamental Subjects.* Boston: Houghton Mifflin Company, 1915. Pp. xii, 329. $1.50.

"This book discusses the teaching of the common fundamental subjects found in elementary schools. It also contains suggestions as to what should make up the course of study in these subjects and it attempts to set forth some of the principles that should underlie methods of instruction and determine the selection of subject-matter. It is essentially a book for the use of teachers and supervisors of schools and for those who are preparing to be teachers..." Practically half of the book is devoted to the subject of English, including reading, composition, grammar, spelling, and penmanship. There is a brief and favorable mention of reading tests, emphasis on the importance of reading as a means to thought development, and stress is laid upon composition both oral and written as training in thought expression. Formal grammar is relegated to higher schools, and full account is taken of recent investigations in spelling in the advice for the study of that subject. In the discussion of penmanship reference is made to the recent scales, but their application is considered to be very limited. In mathematics the Courtis tests receive mention as useful indicators of the abilities of pupils, and there are helpful suggestions concerning the teaching of geography, history, civics, and hygiene. In general the book is written from the point of view of the practical school administrator rather than that of the student of education.

E. L. KEMP. *Methods for Elementary and Secondary Schools.* Philadelphia: J. B. Lippincott and Company, 1915. Pp. xiv, 311.

This is a general methods book of the older type. Part One deals with the principles of general method, and in it the fundamental doctrines show very little evidence of any disturbance by modern scientific studies of education. Part Two is devoted to the kindergarten, but the discussion does not extend as far as Madame Montessori or the more recent experiments in kindergarten practice. Part Three treats of method in the "branches," and the use of this term is in itself a good commentary on the point of view of the author. Here in addition to reading, composition, spelling, etc., are taken up such topics as foreign language, physical science, history, and mathematics. So far as a casual examination reveals, the book might well have been written in 1890, so little evidence does it show of the effects of recent discussions.

SAMUEL C. KOHS. *The Practicability of the Binet Scale and the Question of the Borderline Case.* Bulletin No. 3. Publications of the Research Department of the Chicago House of Correction, 1915. Pp. 23.

The author vigorously defends the Binet Scale against the assaults made upon it by the "unthinking and unknowing critics who have

rapidly advised the use of a new (?) scale claimed to be their own which easily reveals a remarkable plagiarism upon Binet's original." The present bulletin is based upon the examination of 335 cases whose chronological ages fall between 17 and 21. 116 of these are found of normal mentality and 219 or 65 per cent. are pronounced feeble-minded. There is a considerable discussion of individual cases, and reference is made to the use of the Woodworth and Wells Directions Test and to cancellation, construction, ethical discrimination, memory and arithmetic tests.

VACHEL LINDSAY. *The Art of the Moving Picture.* New York: The Macmillan Company, 1915. Pp. viii, 289. $1.25.

In a racy and fascinating style the author discusses the possibilities of the moving picture from the point of view of art. According to him there are three essential types of photo-plays—plays of action, in which the outpouring of physical force at high speed is the main source of drama; plays of intimacy, based on the ability to photograph and magnify small groups at close range; and plays of splendor. Of the latter class we have the fairy-tale splendor, the patriotic splendor, crowd splendor, and the religious splendor. Each of these types the author thinks contains vast possibilities of artistic development, and it is his hope that audiences will become discriminating enough to approve of the artistic plays and to ignore the cruder ones.

HAMILTON WRIGHT MABIE, Editor. *Fairy Tales Every Child Should Know.* New York: Doubleday, Page and Company, 1915. Pp. 266.

This is a splendid edition of some of the good old fairy tales that always delight the hearts of young people. The book contains twelve stories, such as the "Enchanted Stag," "Puss in Boots," "The Ugly Duckling," "The Light Princess," "Jack the Giant-killer," "Beauty and the Beast," "The Story of Aladdin," and others. The book is well constructed, the print is large and clear, and there are numerous full-page illustrations in color.

GARRY C. MYERS. *Grasping, Reaching, and Handling.* Reprinted from the American Journal of Psychology, Vol. 26, October, 1915. 525–539.

A detailed study of the development of hand movements during the first year of an infant's life. The author considers the field of grasping, scratching movements, holding things, errors in reaching, putting things in the mouth, reaching distant objects with long objects, handing objects to a person, creeping for and with objects, and the development of strength in the hands.

JAMES W. NICHOLSON. *Stories of Dixie.* Cincinnati: American Book Company, 1915. Pp. 241.

These stories are largely historical in their nature, and are designed to interest the children of the lower elementary graddes in the story of the development of the south. There are stories of the pioneers, the movement toward the west, the development of New Orleans, life on the plantations, religious and college life, the vicissitudes of the civil war, and the reorganization of social life in the south.

LUELLA A. PALMER. *Adjustment between Kindergarten and First Grade.* Bulletin 1915, No. 24. Washington: Bureau of Education, 1915. Pp. 36.

The kindergarten is an institution which has come to stay. There are now over nine thousand kindergartens in the United States, and in them there are over 400,000 children. The author deplores the fact that in many cases there seems to be a gap between the kindergarten and the public school, and it is with the intention of helping to close this gap that the present monograph is issued. The bulletin presents the results of a study of the views of superintendents, principals, and primary teachers on a desirable adjustment of the work of the kindergarten and the first grade. The chief suggestions for the kindergarten were more independence in handwork periods, more quietness during occupations, removal of the age limit so that a child may be placed in the class which is best fitted to his development, greater attention to English, and the introduction of reading and writing. The adjustments suggested for the first grade are more handwork, greater freedom in discipline, movable chairs and tables, smaller classes, more creative seat work, and the elimination of number work. There is also a discussion of the question of double sessions in the kindergarten.

RICHARD L. SANDWICH. *How to Study and What to Study.* New York: D. C. Heath and Company, 1915. Pp. v, 170.

Part One is entitled "The Principles of Effective Study," and emphasizes the value of self-confidence, of a regular schedule for study, of the value of recall in learning, the use of the synopsis, the cultivation of rapid reading, and the effects of imaginary competition. Part Two takes up the study values of the different school subjects as history, Latin, English, modern languages, mathematics, science, economics, psychology, drawing, and vocational studies, and ends with a consideration of the question: what is efficiency? While the book contains some statements which are open to question, it is in general well-conceived and successfully carried out.

JAMES LEROY STOCKTON. *Exact Measurements in Education.* Chicago: Row, Peterson and Company, 1915. Pp. 57.

The following theses indicate the general position taken by the author: (1) Measurements in education should have for their goal the computation of work and rate of work (power), in the sense in which these terms are used in mechanics; (2) Scales of force, space, and time can be made for school purposes and should be combined into standard units of work and rate of work; (3) Many units in many school subjects should be supplemented by single unit making possible the computation of mental work and rate of mental work (mental power) in all school subjects. The force involved in this computation is intelligence; the space is measured in elements of expression. These theses are elaborated on the basis of recent scales in handwriting, and applications of the Binet tests.

E. H. TAYLOR. *Mathematics in the Lower and Middle Commercial and Industrial Schools of Various Countries Represented in the International Commission on the Teaching of Mathematics.* Bulletin, 1915, No. 35. Whole No. 662. Washigton: Bureau of Education, 1915. Pp. 96.

The first part of this report consists of an account of the schools considered, arranged according to countries. There is a brief statement of the organization of each type of school, the entrance requirements, length of the course, by whom supported, aim of the school and of the mathematical instruction, courses in mathematics, methods of instruction in mathematics, preparation of teachers, examinations, and present tendencies. The second part gives for each type of school in each country the number of years of previous school attendance required for entrance, the approximate age of entrance, number of years in the course, number of hours a week spent in the school, number of hours a week given to the study of mathematics, and course of study in mathematics.

WILLIAM T. WHITNEY. *Moral Education. An Experimental Investigation.* Boston: Leroy Phillips, 1915. Pp. vii, 108.

There is an introductory chapter on the demand for moral education, which is followed by an account of an investigation on the moral life of 600 boys and 600 girls. Their home life, their religious and moral training, their deportment in school, their scholarship, and all that pertains to home training and the training received in the public and secular institutions were carefully observed and examined. The object of the study was to ascertain the relation between religious training and deportment, home training and deportment, and the

effect of deportment upon scholarship. The results are expressed in the form of tables and curves which show the development of both groups. Further chapters point out the relation between the home and morals, suggest the proper method for the teaching of morality, consider the relation between the physical and the moral life, and between manners and morals, discuss the recitation as a medium for moral instruction, and show some of the things the public schools have done in preparing pupils for their life work. According to the author the weak spot in the school is the lack of enough thoroughly trained teachers.